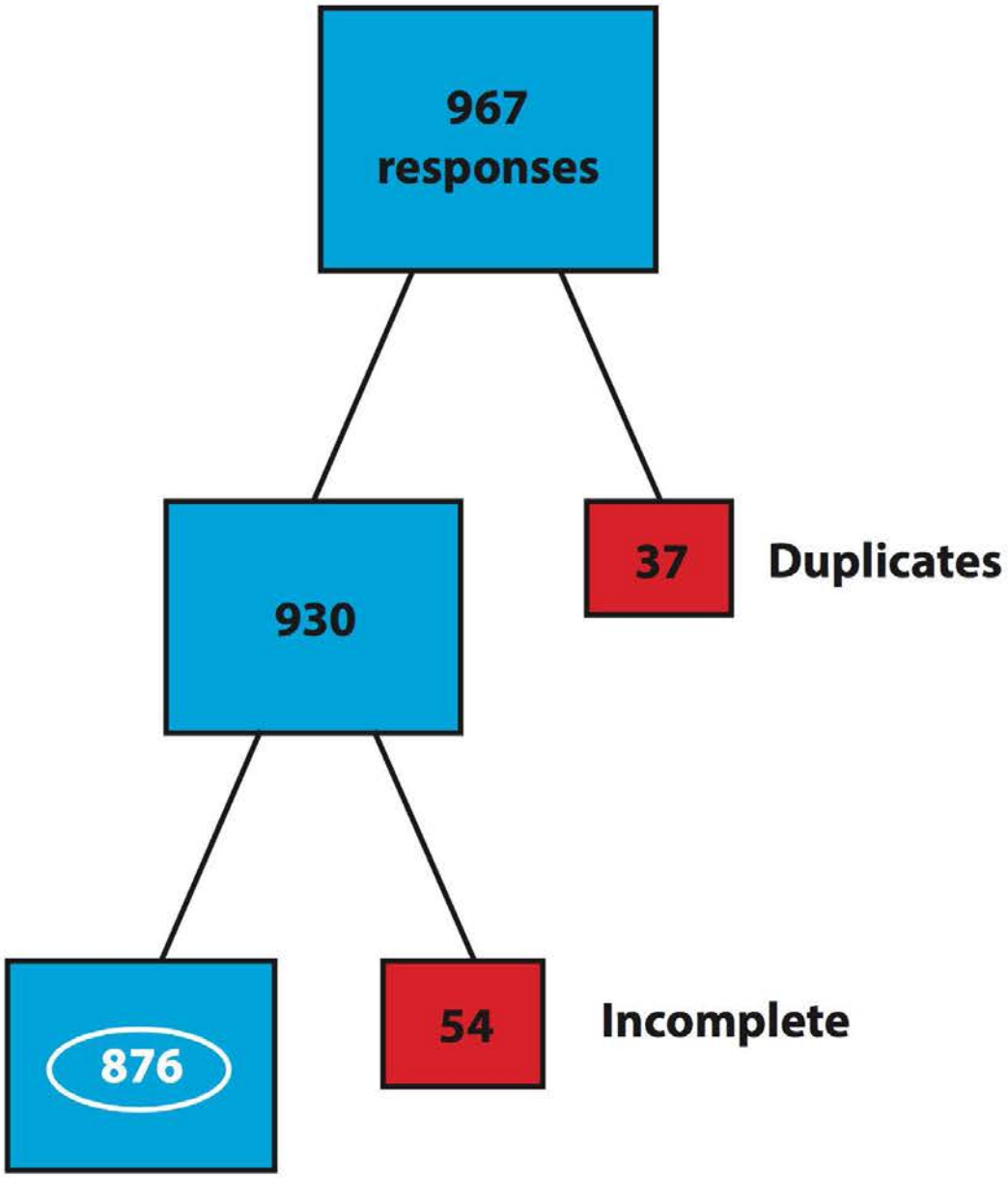
A Community Survey on the NSF Facility
D/V JOIDES Resolution

IODP
INTERNATIONAL OCEAN DISCOVERY PROGRAM

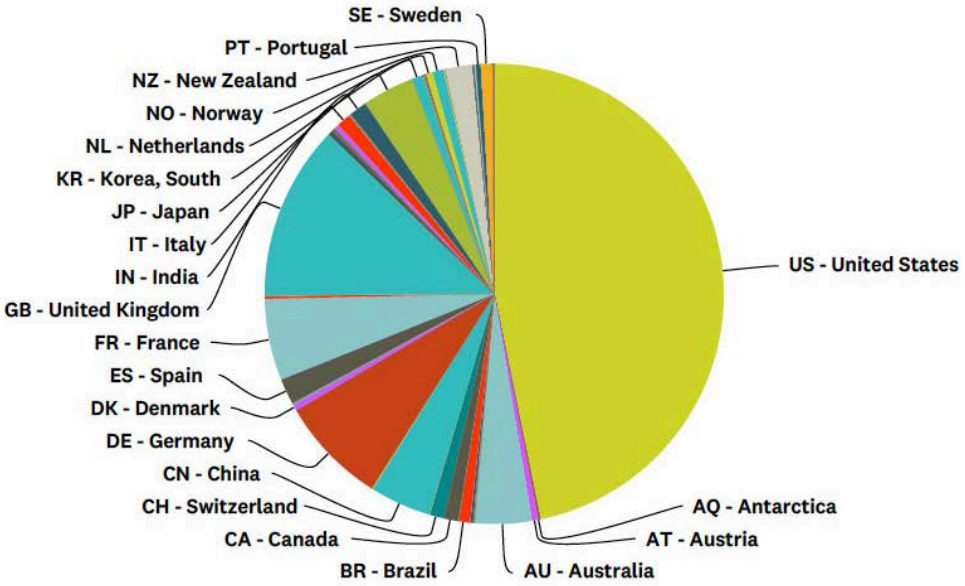
Data Set



A total of 967 responses were received, 37 of which were discarded as duplicates and 54 of which lacked responses to most of the questions. Thus, the final survey size was 876 respondents.

1. Your country of residence

Answered: 876 Skipped: 0



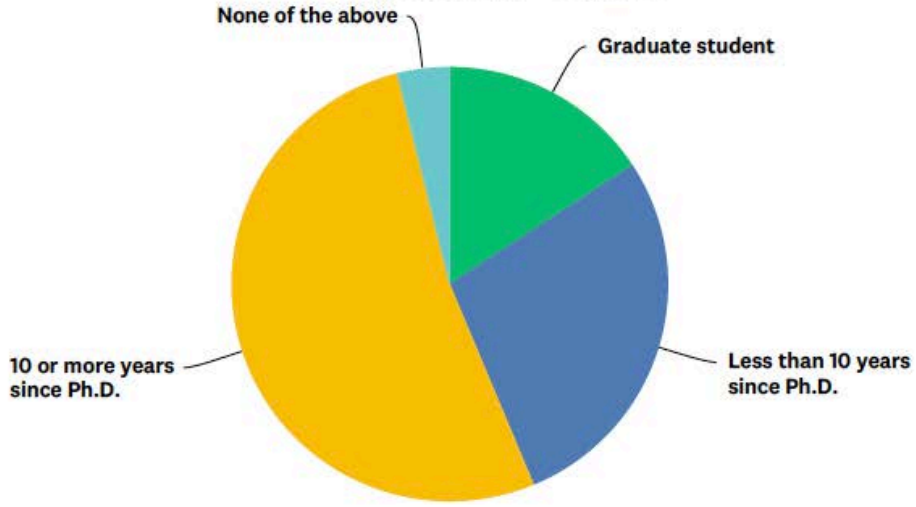
Responses:	
US	410
United Kingdom	108
Germany	66
France	52
China	38
Australia	35
Japan	32
New Zealand	17
Spain	16
Italy	11
Canada	9
India	9
Switzerland	9
Brazil	7
Norway	7
South Korea	7
Sweden	7
Austria	4
Denmark	4
Netherlands	4
Hong Kong	3
Isreal	3

Responses continued on next page

Portugal	3
Belgium	2
Antarctica	1
Bangladesh	1
Columbia	1
Ecudaor	1
Indonesia	1
Ireland	1
Iceland	1
Mauritius	1
Mexico	1
Nepal	1
Philippines	1
Poland	1
Taiwan	1

2. Your career level/experience - All Themes

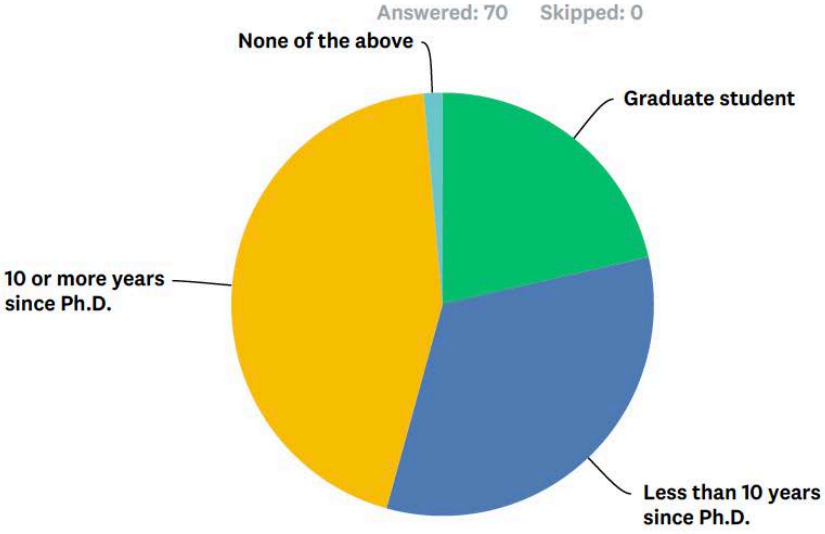
Answered: 876 Skipped: 0



Answer Choices	Responses	
Graduate student	15.75%	138
Less than 10 years since Ph.D.	27.97%	245
10 or more years since Ph.D.	52.40%	459
None of the above	3.88%	34
Total		876

Your career level/experience - Biosphere

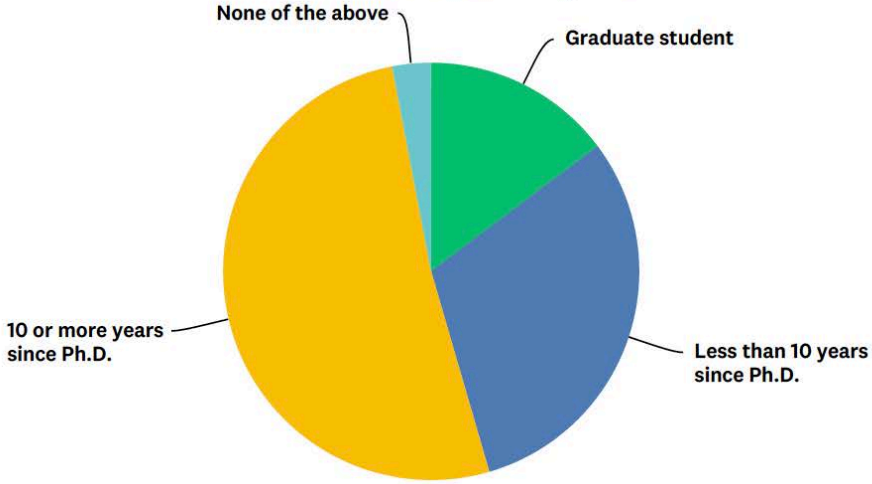
Answered: 70 Skipped: 0



Answer Choices	Responses	
Graduate student	21.43%	15
Less than 10 years since Ph.D.	32.86%	23
10 or more years since Ph.D.	44.29%	31
None of the above	1.43%	1
Total		70

Your career level/experience - Climate & Ocean

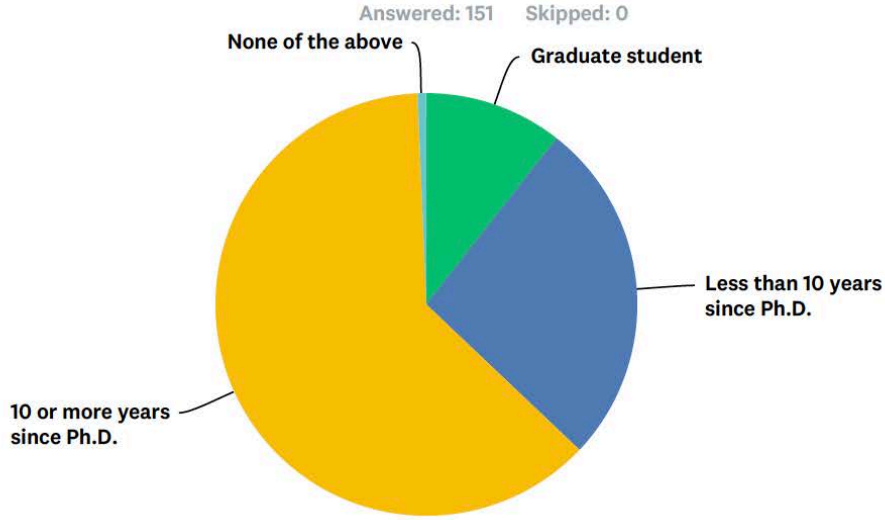
Answered: 400 Skipped: 0



Answer Choices	Responses	
Graduate student	14.75%	59
Less than 10 years since Ph.D.	30.75%	123
10 or more years since Ph.D.	51.50%	206
None of the above	3.00%	12
Total		400

Your career level/experience - Earth Connections

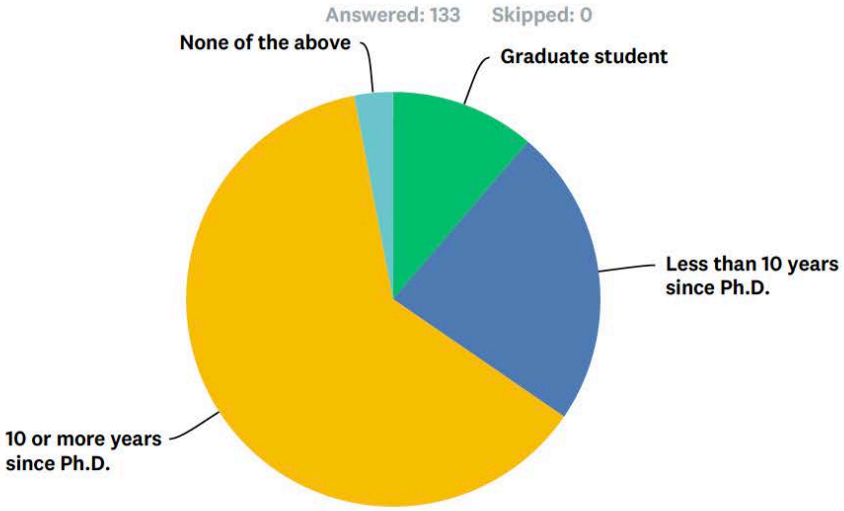
Answered: 151 Skipped: 0



Answer Choices	Responses	
Graduate student	10.60%	16
Less than 10 years since Ph.D.	26.49%	40
10 or more years since Ph.D.	62.25%	94
None of the above	0.66%	1
Total		151

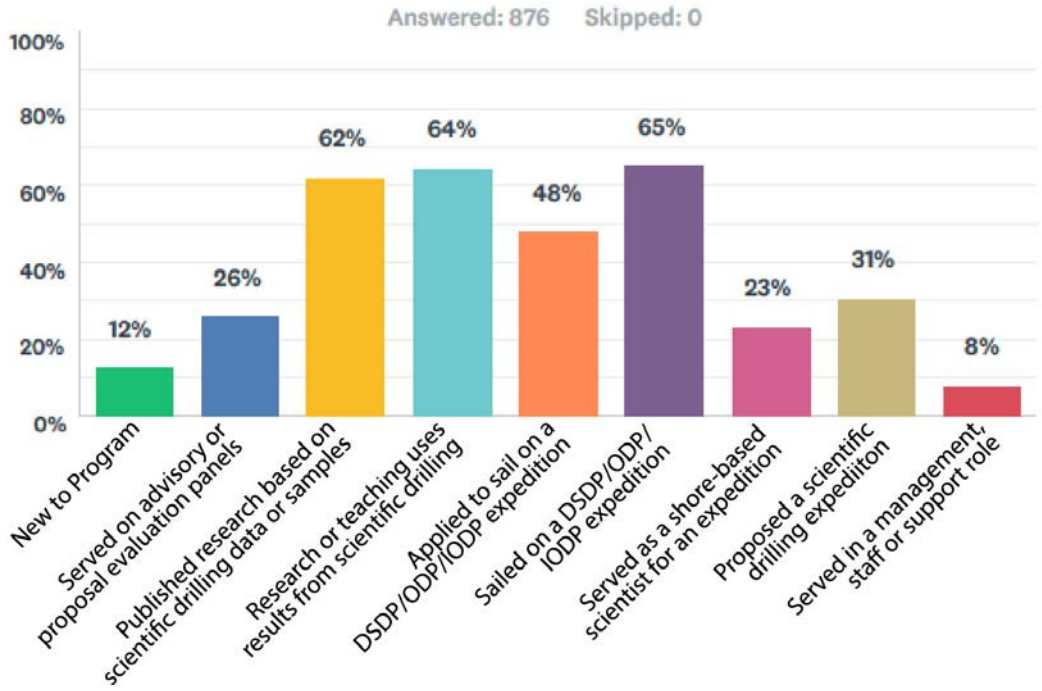
Your career level/experience - Earth in Motion

Answered: 133 Skipped: 0



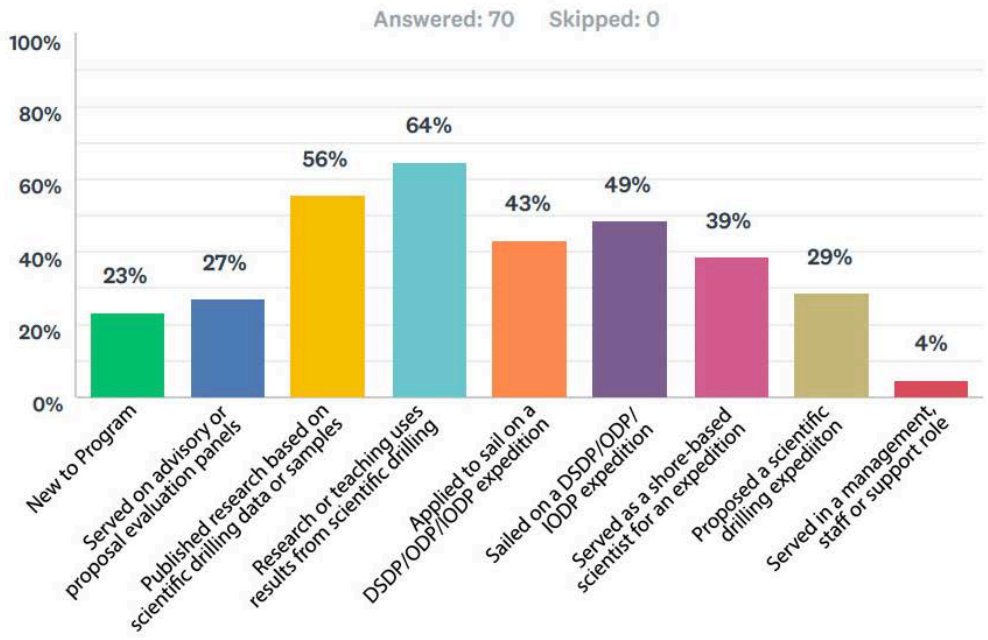
Answer Choices	Responses	
Graduate student	11.28%	15
Less than 10 years since Ph.D.	23.31%	31
10 or more years since Ph.D.	62.41%	83
None of the above	3.01%	4
Total		133

3. Your past involvement with ocean drilling (Check all that apply) - All Themes



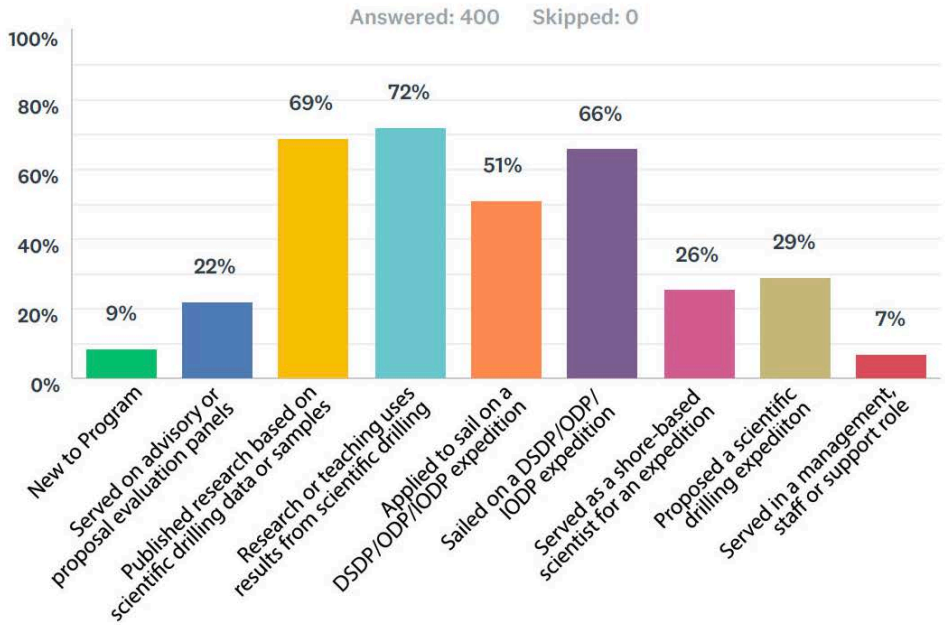
Answer Choices	Responses	
New to program (1)	12%	108
Served on advisory or proposal evaluation panels (2)	26%	227
Published research based on scientific drilling data or samples (3)	62%	543
Research or teaching uses results from scientific drilling (4)	64%	565
Applied to sail on a DSDP/ODP/IODP expedition (5)	48%	419
Sailed on a DSDP/ODP/IODP expedition (6)	65%	573
Served as a shore-based scientist for an expedition (8)	23%	201
Proposed a scientific drilling expedition (9)	31%	269
Served in a management, staff or support role (10)	8%	69
Total Respondents: 876		

Your past involvement with ocean drilling (Check all that apply) - Biosphere



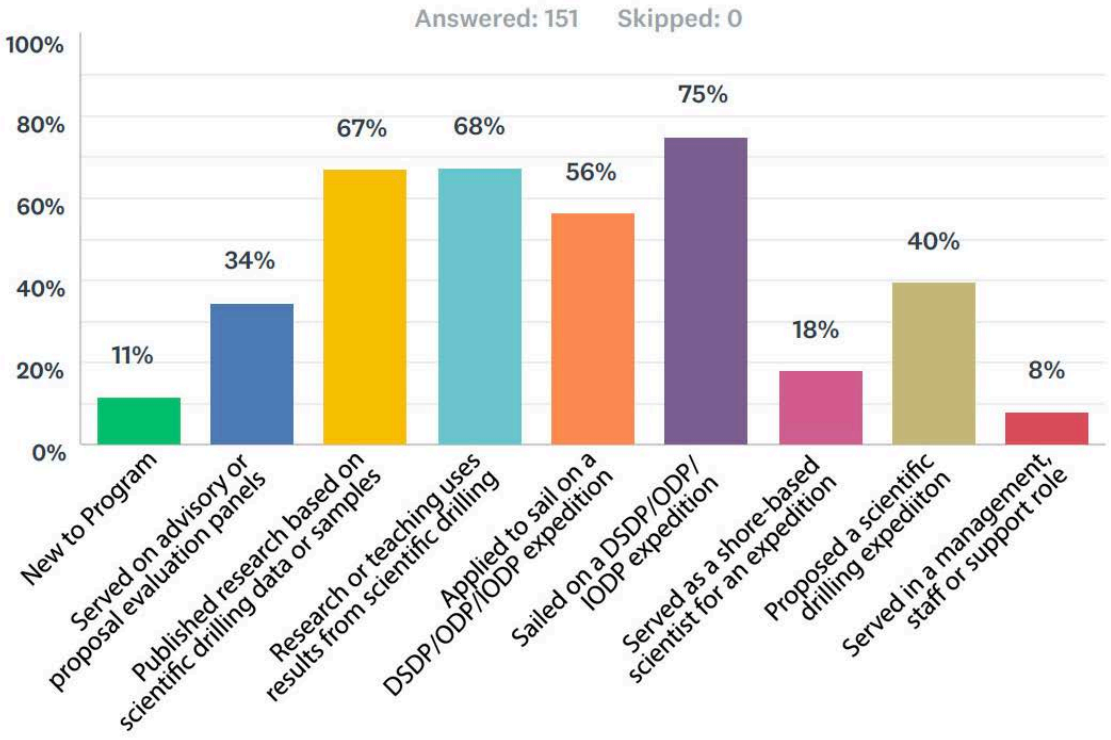
Answer Choices	Responses	
New to program (1)	23%	16
Served on advisory or proposal evaluation panels (2)	27%	19
Published research based on scientific drilling data or samples (3)	56%	39
Research or teaching uses results from scientific drilling (4)	64%	45
Applied to sail on a DSDP/ODP/IODP expedition (5)	43%	30
Sailed on a DSDP/ODP/IODP expedition (6)	49%	34
Served as a shore-based scientist for an expedition (8)	39%	27
Proposed a scientific drilling expedition (9)	29%	20
Served in a management, staff or support role (10)	4%	3
Total Respondents: 70		

Your past involvement with ocean drilling (Check all that apply) - Climate & Oceans



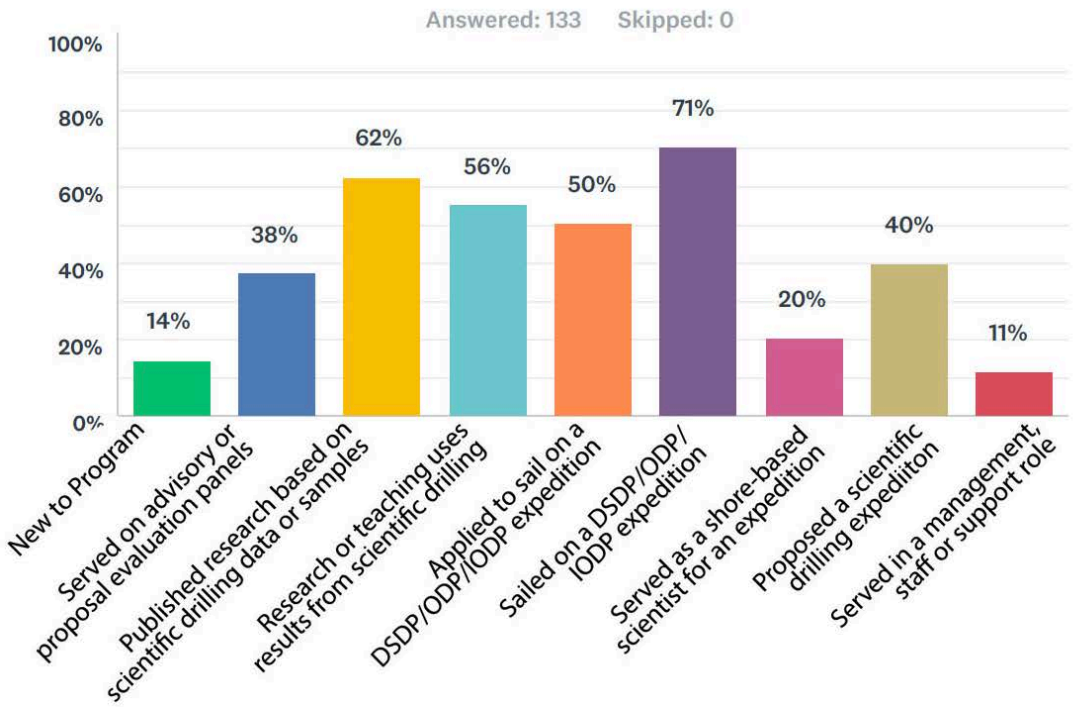
Answer Choices	Responses	
New to program (1)	9%	34
Served on advisory or proposal evaluation panels (2)	22%	88
Published research based on scientific drilling data or samples (3)	69%	277
Research or teaching uses results from scientific drilling (4)	72%	288
Applied to sail on a DSDP/ODP/IODP expedition (5)	51%	205
Sailed on a DSDP/ODP/IODP expedition (6)	66%	265
Served as a shore-based scientist for an expedition (8)	26%	103
Proposed a scientific drilling expedition (9)	29%	117
Served in a management, staff or support role (10)	7%	29
Total Respondents: 400		

Your past involvement with ocean drilling (Check all that apply) - Earth Connections



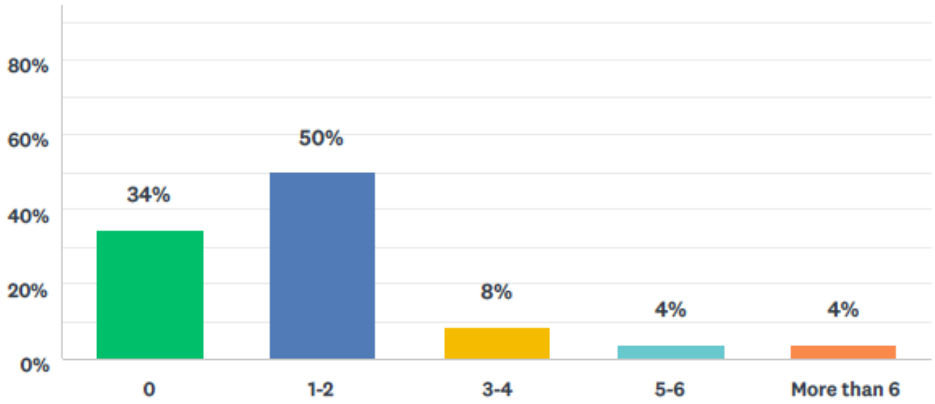
Answer Choices	Responses	
New to program (1)	11%	17
Served on advisory or proposal evaluation panels (2)	34%	52
Published research based on scientific drilling data or samples (3)	67%	101
Research or teaching uses results from scientific drilling (4)	68%	102
Applied to sail on a DSDP/ODP/IODP expedition (5)	56%	85
Sailed on a DSDP/ODP/IODP expedition (6)	75%	113
Served as a shore-based scientist for an expedition (8)	18%	27
Proposed a scientific drilling expedition (9)	40%	60
Served in a management, staff or support role (10)	8%	12
Total Respondents: 151		

Your past involvement with ocean drilling (Check all that apply) - Earth in Motion



Answer Choices	Responses	
New to program (1)	14%	19
Served on advisory or proposal evaluation panels (2)	38%	50
Published research based on scientific drilling data or samples (3)	62%	83
Research or teaching uses results from scientific drilling (4)	56%	74
Applied to sail on a DSDP/ODP/IODP expedition (5)	50%	67
Sailed on a DSDP/ODP/IODP expedition (6)	71%	94
Served as a shore-based scientist for an expedition (8)	20%	27
Proposed a scientific drilling expedition (9)	40%	53
Served in a management, staff or support role (10)	11%	15
Total Respondents: 133		

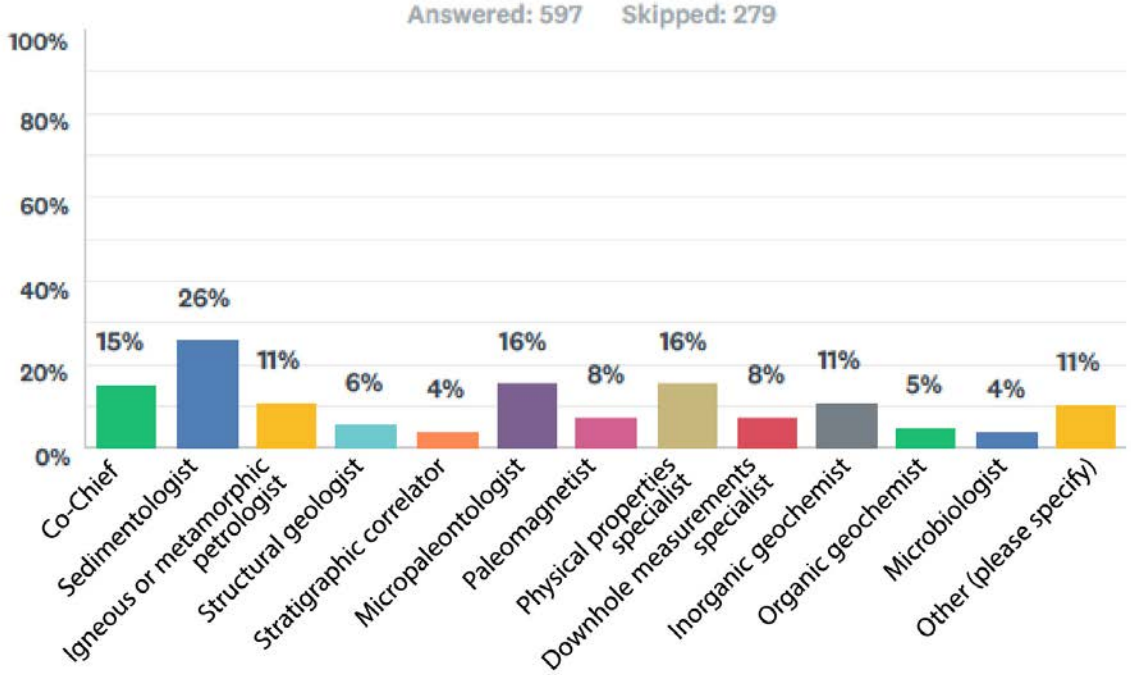
4. How many times have you sailed on the JR?



Answer Choices	Responses	
0	34%	301
1-2	50%	436
3-4	8%	74
5-6	4%	34
More than 6	4%	31
Total		876

5. If you have sailed, in what role(s) have you done so? (Check all that apply)

Answered: 597 Skipped: 279



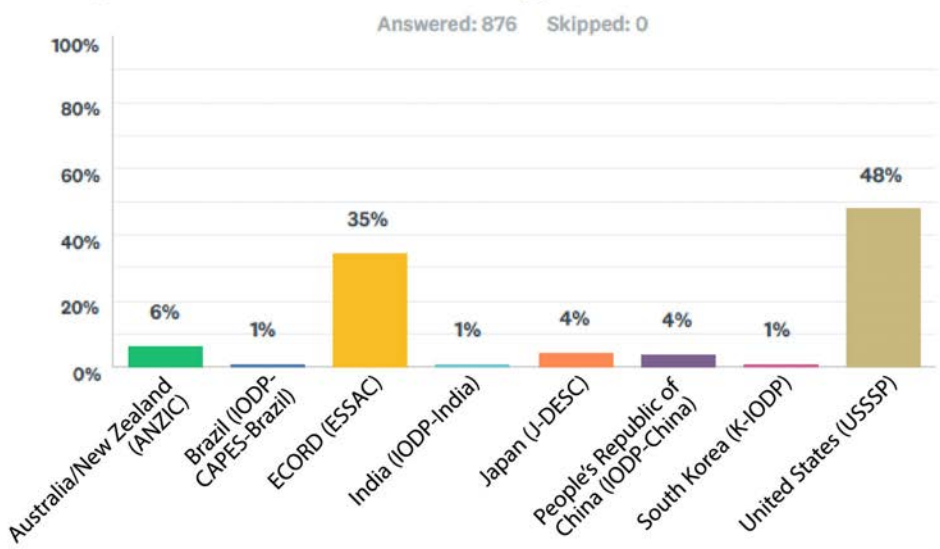
Answer Choices	Responses	
Co-Chief	15%	89
Sedimentologist	26%	156
Igneous or metamorphic petrologist	11%	65
Structural geologist	6%	35
Stratigraphic correlator	4%	25
Micropaleontologist	16%	93
Paleomagnetist	8%	45
Physical properties specialist	16%	94
Downhole measurements specialist	8%	45
Inorganic geochemist	11%	65
Organic geochemist	5%	31
Microbiologist	4%	25
Other (please specify)	11%	63
Total Respondents: 597		

Other Responses:	
Educator/Teacher/SOR instructor	24
Staff Scientist	9
Technical staff/Curator	6
Geophysicist	4
Other science role	4

Responses continued on next page

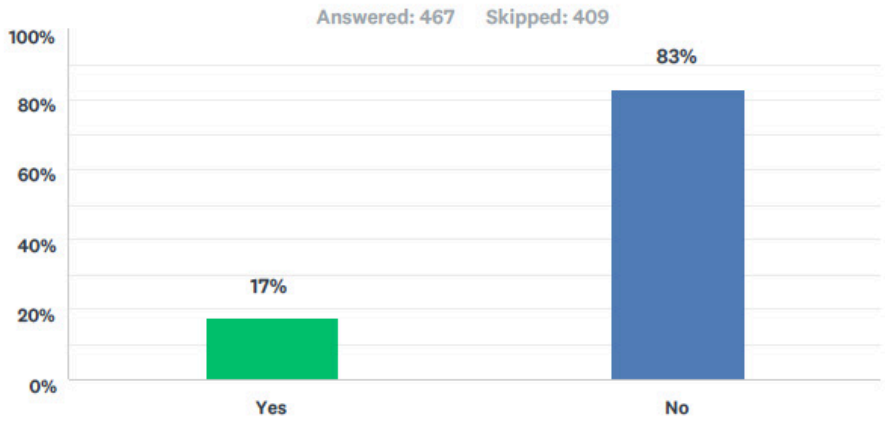
CORK/observatory	3
Logging Staff Scientist	2
Logging Scientist	2
Other support role	2
Videographer	2
Readiness Assessment Team	1
Engineer	1
Observer	1
Student trainee	1

6. Your current Program Member Office



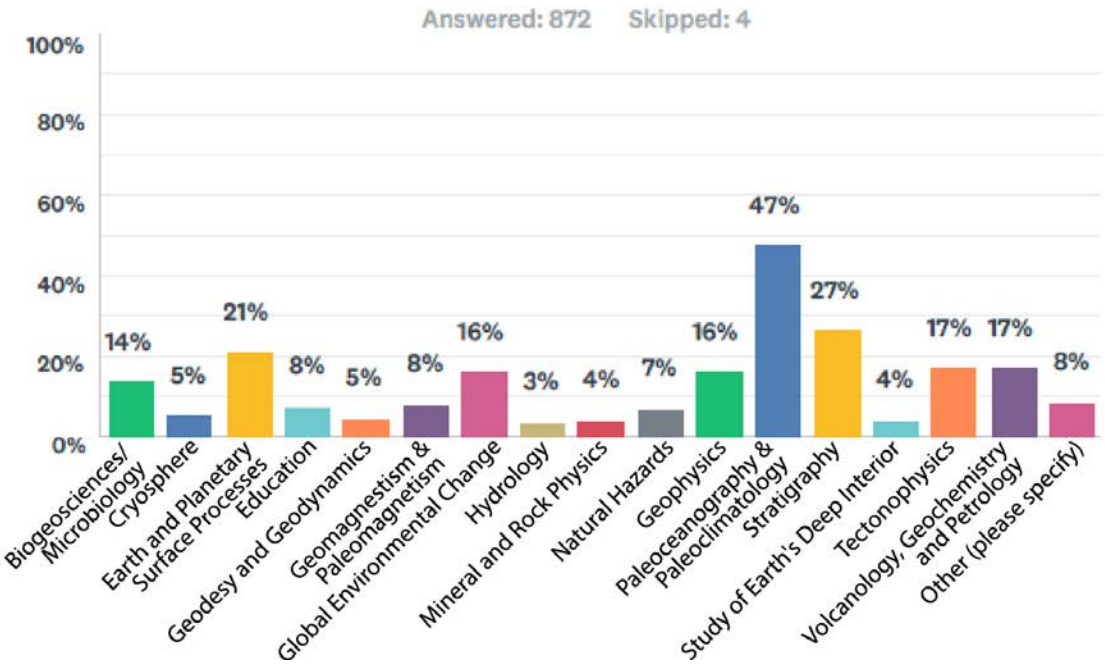
Answer Choices	Responses	
Australia/New Zealand (ANZIC)	6%	56
Brazil (IODP-CAPES-Brazil)	1%	7
ECORD (ESSAC)	35%	304
India (IODP-India)	1%	10
Japan (J-DESC)	4%	38
People's Republic of China (IODP-China)	4%	34
South Korea (K-IODP)	1%	7
United States (USSSP)	48%	420
Total		876

7. If the U.S. Science Support Program is not your current Program Member Office, have you previously received support from USSSP?



Answer Choices	Responses	
Yes	17%	81
No	83%	386
Total		467

8. What would you say is/are your primary discipline(s)? (Check all that apply)



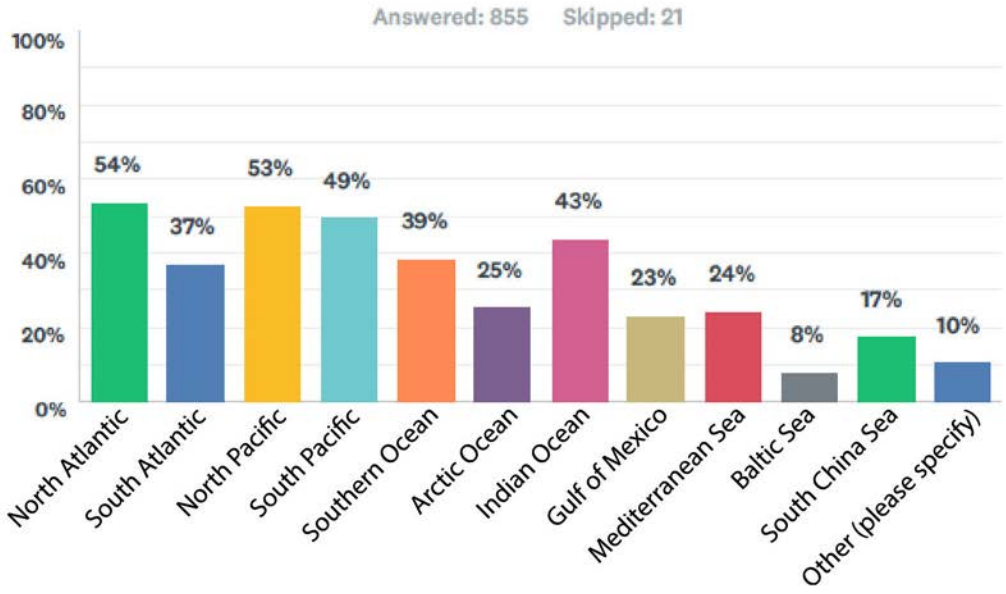
**Some respondents listed multiple specialties.*

Answer Choices	Responses	
Biogeosciences/Microbiology	14%	119
Cryosphere	5%	47
Earth and Planetary Surface Processes	21%	185
Education	8%	66
Geodesy and Geodynamics	5%	41
Geomagnestism & Paleomagnetism	8%	71
Global Environmental Change	16%	138
Hydrology	3%	29
Mineral and Rock Physics	4%	35
Natural Hazards	7%	60
Geophysics	16%	140
Paleoceanography and Paleoclimatology	47%	414
Stratigraphy	27%	233
Study of Earth's Deep Interior	4%	33
Tectonophysics	17%	147
Volcanology, Geochemistry and Petrology	17%	149
Other (please specify)	8%	72
Total Respondents: 872		

"Other" responses on next page

Other Responses:	
Sedimentology	14
Paleontology/micropaleontology/biostratigraphy	11
Organic geochemistry	5
Tectonics	5
Hydrogeology/hydrothermal systems	3
Structural geology	3
Evolutionary biology	3
Paleobiology	3
Energy/Mineral & Natural resources	2
Seismic stratigraphy	2
Biogeochemistry	2
Isotope geochemistry	2
Downhole measurements/tools	2
Gas hydrates	2
Geochemistry	2
Teacher/lecturer	2
Deep biosphere	2
Geomechanics	1
Fluid geochemistry	1
Volcanism	1
Sedimentary petrography	1
Paleotempestology	1
Environmental sciences	1
Film/arts	1
Curation	1
Pedology	1
Climate change	1
History of Earth & Life	1
Igneous petrology	1
Paleoecology	1

9. Your geographic interest (Check all that apply)



**Some respondents listed multiple specialties.*

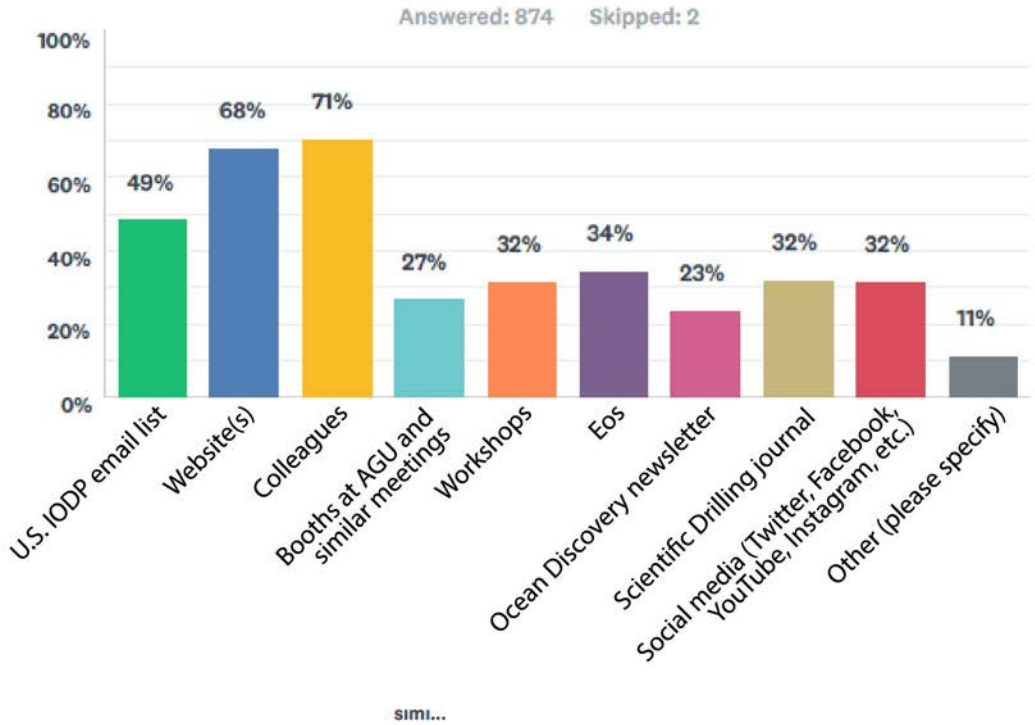
Answer Choices	Responses	
North Atlantic	54%	458
South Atlantic	37%	318
North Pacific	53%	450
South Pacific	49%	422
Southern Ocean	39%	331
Arctic Ocean	25%	217
Indian Ocean	43%	371
Gulf of Mexico	23%	196
Mediterranean Sea	24%	205
Baltic Sea	8%	69
South China Sea	17%	149
Other (please specify)	10%	89
Total Respondents: 855		

Other Responses:	
"Global" or thematically-based response	28
Western Pacific	10
Equatorial Pacific	9
Caribbean Sea	7
Antarctica/Antarctic Ocean	7
East China Sea/Sea of Japan	3

Responses continued on next page

Gulf of California	3
Black Sea	3
Red Sea	3
Global tropics	3
Equatorial Atlantic	3
Bering Sea	2
Gulf of Alaska	2
North Sea	2
Mozambican Channel	1
Solomon Islands	1
California Coast	1
High latitudes	1
Central America	1
Indo-Pacific	1
Tasman Sea	1
Coral Sea	1

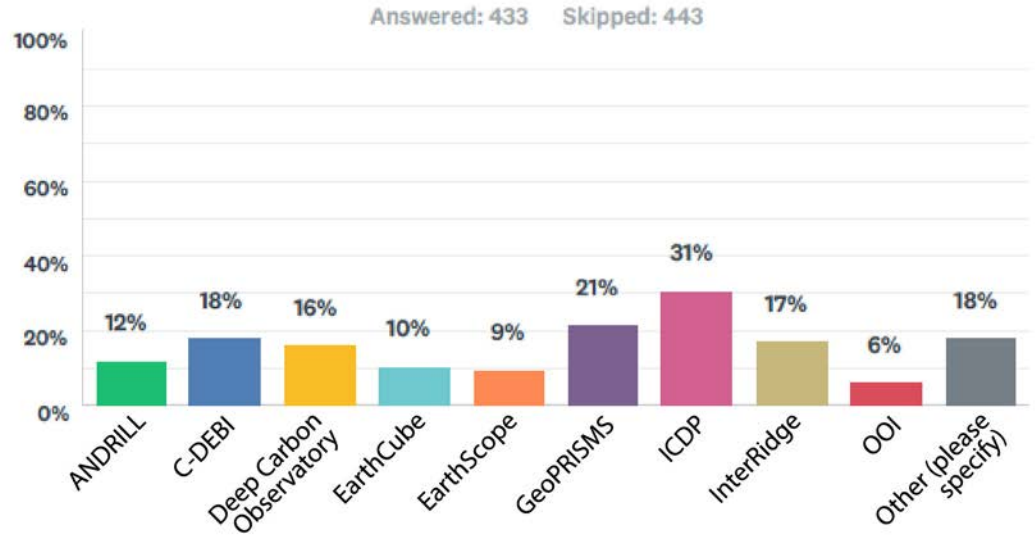
10. How do you receive information about IODP? (Check all that apply)



Answer Choices	Responses	
U.S. IODP email list	49%	426
Website(s)	68%	595
Colleagues	71%	617
Booths at AGU and similar meetings	27%	237
Workshops	32%	277
Eos	34%	300
Ocean Discovery newsletter	23%	204
Scientific Drilling journal	32%	280
Social media (Twitter, Facebook, YouTube, Instagram, etc.)	32%	277
Other (please specify)	11%	99
Total Respondents: 874		

The overwhelming majority of “other” responses referenced non-US PMO-generated information (PMO newsletter, mailing list, etc.)

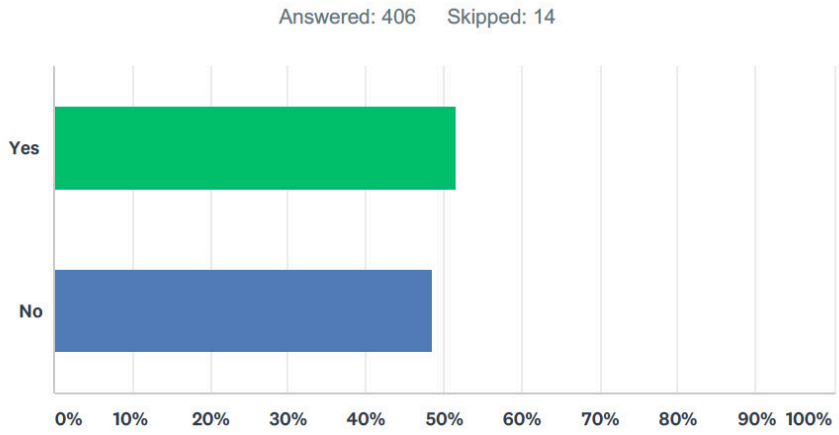
11. Other than IODP, do you participate or have you participated in any other initiatives or community groups? (Check all that apply)



Answer Choices	Responses	
ANDRILL	12%	51
C-DEBI	18%	77
Deep Carbon Observatory	16%	70
EarthCube	10%	45
EarthScope	9%	41
GeoPRISMS	21%	93
ICDP	31%	133
InterRidge	17%	74
OOI	6%	28
Other (please specify)	18%	78
Total Respondents: 433		

Other Answers with three or more responses:	
IMAGES	8
PAGES	8
MARGINS	4
SCAR	3

12a. Have you applied to NSF-OCE for support for projects that utilize IODP samples or other data? (Data represents US respondents only).



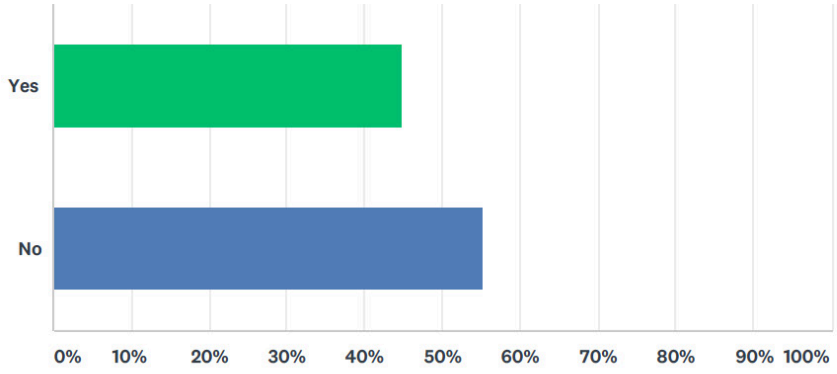
ANSWER CHOICES	RESPONSES	
Yes	51.48%	209
No	48.52%	197
TOTAL		406

12b. If not, why not? (Data represents US respondents only. Answers sometimes included more than one category).

Responses	
Didn't need to	31
Grad student/Not able to yet	21
Will do so soon	20
Didn't know this opportunity existed	10
Applied elsewhere	6
Ineligible	6
Not relevant (not a researcher or retired)	5
Too hard/Not enough time	4

12c. Have you received NSF-OCE support for projects that utilize IODP samples or other data? (Data represents US respondents only).

Answered: 387 Skipped: 33



ANSWER CHOICES	RESPONSES	
Yes	44.70%	173
No	55.30%	214
TOTAL		387

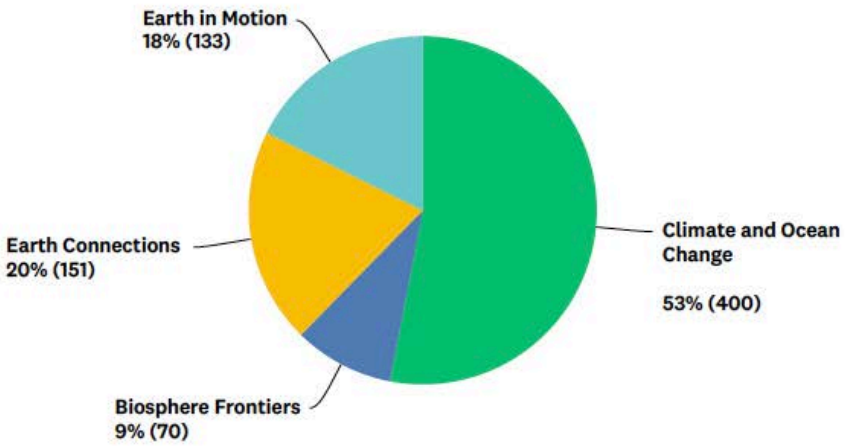
13. If you are a U.S.-based scientist: Where, orther than NSF-OCE, do you apply for and/or receive research funding? (Data represents US respondents only).

Funding sources named at least 5 times:

Responses	
NSF-EAR	61
NASA	44
Dept. of Energy	38
American Chemical Society	28
NSF-Polar/Antarctic	25
Industry	23
NOAA	23
University/Institutional	21
NSF-GEO	18
Private foundations	17
USGS	16
C-DEBI	14
USSSP	13
GSA	10
Deep Carbon Observatory	9
NSF-Tectonics	8
NSF-P2C2	8
NSF-MGG	7
Foreign support	7
ONR	5
BOEM	5
AAPG	5
(All Other NSF)	26

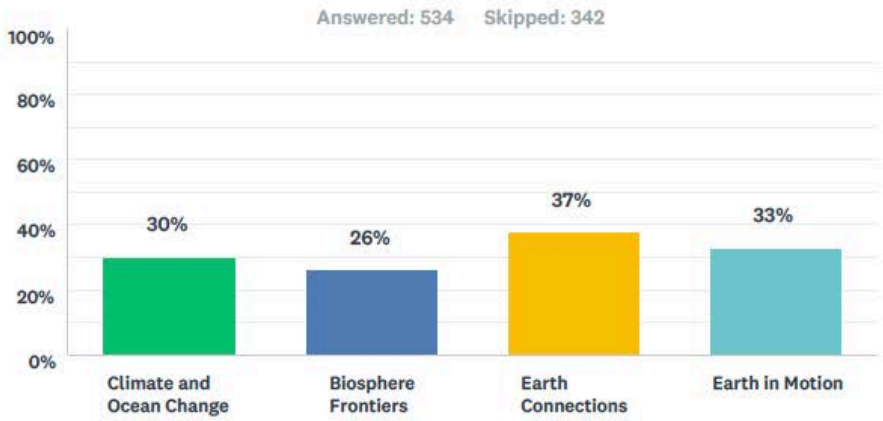
14a. Using the 2013-23 IODP Science Plan as a guide, with which science theme do you most strongly identify? Select one option only.

Answered: 754 Skipped: 122



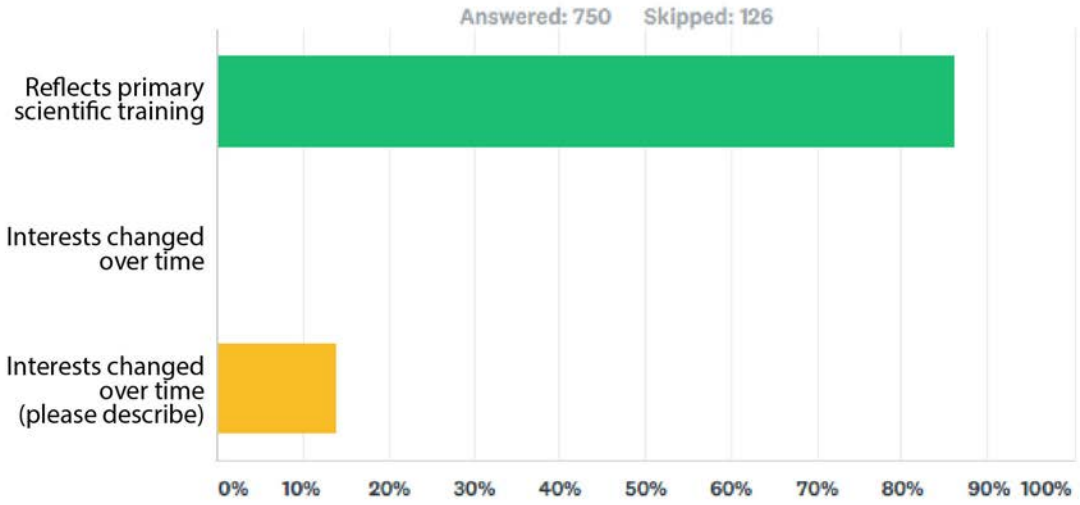
Answer Choices	Responses	
Climate and Ocean Change	53%	400
Biosphere Frontiers	9%	70
Earth Connections	20%	151
Earth in Motion	18%	133
Total		754

14b. Does your work involve other themes as well? Select all that apply; do not include the primary theme you identified in 14a.



Answer Choices	Responses	
Climate and Ocean Change	30%	160
Biosphere Frontiers	26%	140
Earth Connections	37%	199
Earth in Motion	33%	174
Total Respondents: 534		

15. Does the theme you checked in Question 14a reflect your primary scientific training or have your interests changed over time? If the latter, please describe.



Answer Choices	Responses	
Reflects primary scientific training	86.27%	647
Interests changed over time	0.00%	0
Interests changed over time (please describe)	13.73%	103
Total		750

#	Interests changed over time (please describe)
1	it depends of the scientists i assist.
2	Primary scientific training in physicsn than moved to geosciences
3	Learned that each and every aspects of Science are important and must work together to understand better the science of Earth and natural processes.
4	I study salt tectonics, which have analogies with ice sheets. I have also been involved in thrust-belt projects
5	My primary training was in geoscience, particularly geophysics, related to petroeum exploration. I developed a career in academia, initially using geophysics to study tectonic processes and history, but progressively migrated to working on global environmental change because of the availability of funding and societal relevance.
6	My Ph.D. is from food microbiology related to industry with over period my interest has changed about the ocean as I am employed in Biological Oceanogrpahy division, CSIR-NIO, Goa
7	Since my post-doc work till now, my research interests include radionuclides distribution and circulation in atmosphere, marine environment and erosion processes. Recently we are focus on submarine geohazards and sediments source to sink study which also include the role of extreme events on carbon cycles.
8	Collaborations with colleagues in the related fields checked in 14b I have become interested in studying the interrelationships between all aspects of ocean science related to processes associated with subduction.
9	interdisciplinary work with others; my interests range from fundamental geophysics (variability of geomagnetic field - PSV/excursions/reversals) to fundamental regional-scale space/time variability of paleoceanographic/paleoenvironmental processes

10	Interest has turned to stratigraphy
11	My primary role is as a life science educator. I have expanded into teaching earth and environmental sciences.
12	My early research was more closely related to the Climate and Ocean Change theme, but starting with a post-doc project, I began working more in the Earth Connections area.
13	Now more involved with marine stratigraphy, previously more with tectonics.
14	more petrologically
15	I started as an inorganic geochemist and I am now a biogeochemist (trying to understand the role biological processes play in geochemical processes).
16	moved from water/rock interaction (oil and mining) to climate change
17	My first masters was in Ecology before I became an educator.
18	I studied Paleogene shallow-marine sediments through fieldworks until early pos-doc career. Eight years ago, I have studied in Scripps Institution of Oceanography and switch my work to the ocean drilling and marine geology field. I have been keeping primary scientific interests in paleoclimate and paleoceanography, but needed to learn methods in marine geology when my work changed.
19	Since the glbal cimate change is rapdeily progressing in this time, we should know how it effectt on the natural conditions of marine system
20	Primarily started in forest paleo-ecology, but now utilize fossil pollen to improve historic period dating of hurricane records
21	moved from more geological themes to utilization to geophysical tools (e.g.) borehole measurements and imaging.
22	Trained as a geochemist. Applying my research to ocean science is a new direction for me.
23	My primary training is closer to the Earth Connection theme.
24	Trained as inorganic chemist; becoming a geobiologist
25	Change and primary
26	I am trained as an environmental engineer and hydrologist, but the focus of my current project is to apply my knowledge to the biosphere.
27	planetary -> Antarctic science
28	My interests have evolved to new systems and processes, ie, study of lithosphere formation and evolution. Previously I have typically studied sedimentary systems.
29	Now largely do research on environmental geochemistry and human health
30	I am a filmmaker and anthropologist who works with scientists to document their work
31	I was trained in basin modeling. Over time, I became much more involved in the exploration of the Arctic Ocean. This is my primary focus now.
32	My interests and training have recently shifted from a more geological focus to a more (marine) geophysical focus.
33	Trained as a field geologist/invertebrate palaeontologist
34	Started with continental margin geology
35	working in mountain ranges to understand orogeny, changed or expanded interests in sediment sinks as a record of changes in sediment source through time
36	Shifted from geodesy to paleoclimate and back again. Present Proposal to IODP, 730-Full2 is paleoclimatology though.
37	From theoretical geochemistry to field-based, lab-based, and modeling-based geobiology and environmental microbiology
38	Previously a terrestrial soil microbiologist
39	My interests have evolved as scientific frontiers have moved.

40	I'm a geochemist first and foremost, and so I bounce around between 14a and 14b pretty equally, as well as "Earth Connections".
41	Terrestrial macro-biology > science education filmmaking
42	The type of samples have changed, but not the general elements I study. I still do research in carbon and nitrogen compounds and isotopes, however, I used to be an open-ocean oceanographer, but now am doing mostly sediment research.
43	Yes, but the questions you can address result from the tools you use and how they progress, so in that sense my interests have evolved over time.
44	I am still primarily an isotope geochemist but the problems I study vary over time.
45	Have moved from traditional petrology to using petrology to look at long term C cycle
46	Well, my PhD training was in Paleomagnetism. IODP has definitely opened a lot of new scientific avenues for me.
47	I am a biochemist by training with interests in enzymes and cellular transport processes. However, my latent interest in Oceanography as well as contact with some of the leaders of the DSDP and ODP motivated me to shift my focus towards the subsurface biosphere. The
48	Rally changed. I had an interest in ecological modelling that was in the early draft of the 2013-2023 document, but it was cut.
49	Primary training was in palaeomagnetism applied to tectonics. Interest in rock magnetism,and applications to fluid systems and gas hydrate accumulation and migration, developed as a result of ODP/IODP involvement
50	I started as a geography researching Heinrich Events (D/O cycles) in the North Atlantic. I am now an archaeologist - tying the fields together.
51	Training was in micropaleontology but my research has broadened to encompass a wider range of methods to understand past climate and ocean change
52	I am an educator so I like to teach various aspects of the research.
53	I have now an industrial experience in oil and gas (using borehole data as well as borehole images to assess the geology)
54	I started as a micropalaeontologist and stratigraphy, but my interest now focus on environmental change and evolution.
55	Trained as an ecologist; began working on ecology and evolution of corals and reefs; moved into geological history of reefs; expanded into biogeology of carbonates in space and time
56	Stratigraphy and tectonics rather than structural geology and tectonics.
57	Primarily trained in isotope geochemistry, starting applying to paleoclimate duting postdoc
58	My PhD was in Geophysics (Paleomagnetism and Rock Magnetism, focused in magnetostratigraphy), but since my post-doc I have worked mainly on identification of centennial- to millenial-scale quasi-periodicities which may have linked to major climate oscillations, based on paleoclimatic proxies.
59	From geology
60	Phd in geodynamics/tectonics. Now a volcanologist.
61	Primary scientific training in geology and carbon cycling
62	Originally my work was more paleobiological and paleomagnetic; it has evolved to focus mostly on paleoclimate
63	I am trained as an isotope geochemist/sedimentary geochemist. My interests were originally focussed on tectonics and continental crust evolution. I have expanded my interests to geochronology and paleoclimate/paleoceanography. I am also interested in seawater chemistry through time and processes that control it.

64	They have changed because although I started in the traditional area of geodynamics, which primarily involves development of theories and computations, using physics, applied mathematics and mechanics, I have become much more involved with testing those ideas through ocean drilling and other data. I have found IODP to be extraordinarily welcoming to me even though I had no training and little experience with ocean going research.
65	Background in solid earth sciences but moved to Climate and Ocean research over the years.
66	PhD research was in sediment routing/landscape and basin evolution. I then spent seven years working in the old and gas industry, with an emphasis on geophysics/seismic interpretation. I am now interested in a variety of marine sedimentary processes including thermohaline circulation and submarine landslides.
67	Being an educator for scientific issues, I am interested in almost everything
68	Sedimentary geochemistry, pore fluids, diagenesis to... Climate and paleoclimate, ocean and land to... Origins of biodiversity on geologic time scales
69	My primary science training involved reconstructing ocean change with time. I am now interested in reconstructing ice volume and weathering landscapes with time.
70	I started out as a forensic scientist, became an environmentalist, then got hired to teach physics, which then expanded to teaching most of the sciences offered by the city's schools (8 different sciences)
71	Began working only on nearshore/shallow water sedimentary record, mostly as a biostratiigrapher, but my focus of research has changed towards examining extreme climatic events in deep time.
72	I have been trained as a paloceanographer but have moved into biotic response to climate change
73	moving towards long-term environmental changes
74	ancient plate tectonics
75	My interested have changed from coastal landscape evolution to deep marine sediment transport and depositional environments
76	primary training was in water column microbiology/biogeochemistry - started deep biosphere work as a postdoc
77	from passive margins (climate-sealevel) to tectonics (earthquakes-tsunamis)
78	I use the oceanography-sedimentology-stratigraphy link.
79	M.Sc. in Sedimentology, Ph.D. in oceanography, Postdoc with isotope geochemistry, moving into pore water geochemistry/deep biospehere and reaction transport modeling, and now into Earth System modeling
80	I started as an outcrop sedimentologist/stratigrapher interested in fundamental processes; I'm now more interested in using the sedimentary record to reconstruct paleo environments/climate.
81	civil engineering
82	Started out in sedimentology but moved progressively into tectonics, in particular with respect to subduction zone processes.
83	I was trained as a traditional land-based tectonic geologist but now I'm interested in the relationships between surface processes and tectonics
84	I was initially drawn to paleoclimate/oceanography driven questions, but after my experience at sea, moved towards more modern biogeochemistry questions.
85	Now working primarily in geoscience education research
86	more biologically oriented
87	My early interests were in Australian onshore stratigraphy and sedimentology; gradually moved into marine geoscience and petroleum geology; now run the Australian IODP Office with very broad interests.

88	Research has evolved from tectonophysics to tectonic-climate interactions and roles of impact cratering on life
89	I started out in geochemistry, manganese nodules and hydrothermal systems. This evolved into an interest in biogeochemistry as a mechanism to move trace metals in the oceans, to paleoproductivity and how past ocean conditions as well as plate tectonic connections have altered water and nutrient pathways.
90	My Ph.D. research was in climate change, my interests have changed to subduction zones.
91	My training is in biological-chemical coupling, however it has expanded into the subsurface from the sediment surface.
92	my interests have evolved to include more in the realm of environmental change
93	first paleoalteration (calcrete and silcrete: continental realm) then evaporite (both continental and marine) then Organic Matter rich deposits (sapropels) and pre-evaporitic deposits then authigenic carbonate deposits linked to anaerobic oxidation of biogenic methane
94	From pure fundamental geophysics research in the 80s, interests have become much broader to include global change, hazards, but also resources and environment
95	My early career focused on how organic matter became incorporated into the geosphere, and my interests gradually transitioned into the identifying the origins of this organic matter and its associated paleoenvironmental information.
96	Biology, terrestrial palynology
97	As defined by IODP science plan None of the stated themes are central to my training as a paleobiologist. The research program that I and a few others follow that is based on deep-sea microfossils has never been strongly reflected in any of the official science plan documents (tho we have tried to get it put in each time in the community writing stage)
98	from subtropics and carbonate platforms to the (sub)Antarctic regions
99	My background is in marine geology and geophysics. I then got interested in methane hydrate deposits in continental margins with a focus on microbial degradation of organic matter and methanogenesis.
100	My research covers a broad range of subject matter, mostly in rocks older than those present on the modern sea floor, but drilling results are important analogues.
101	trained in solid earth geochemistry, now working mainly in paleoceanography/paleoclimate
102	Interests have broadened into ocean/climate area.
103	have varied from structural geology, tectonics, metamorphic, igneous geology, now chemical weathering and geological carbon storage

	16. What new scientific or technical developments has the JR facilitated in your field over the last ~4 years (since the implementation of the 2013-23 Science Plan)?	17. How do these new developments address the themes in the Science Plan?
Biosphere	Sediment deformation along subduction zones; Cretaceous and Paleogene sedimentary record, paleoceanography and paleoclimate.	Relate to Earth in Motion but also Biosphere Frontiers; Climate and Ocean Change
	The JR continues to offer a unique capability to sample and measure sediments deeply buried beneath the seafloor.	Without deep sampling it would be impossible to address any of the Science Plan themes.
	New research direction into subsurface microbiology coupled with subsurface hydrography.	
	Anything regarding a better understanding of microbial life in the subseafloor is an advancement in the field.	
	Expanded our understanding of the limits of life--both through microbiological and chemical investigations--mostly in terms of how many cells are there and how active they are.	Work has partially addressed challenge 5, setting some bounds on the composition and global significance, but there are remaining questions about its origin (challenge 5) and community sensitivity to change, both through earth history and moving foward (challenge 7). Similarly, we've put some estimates on the limits of life (challenge 6) just by looking where cells are sparse and inactive, but need to do further work to understand the mechanisms underlying the limits of life.
	expanded capabilities of microbiology lab (clean bench) improved camera system for inspecting borehole	better sample handling for low biomass samples
	Standard paleoceanogaphic coring associated with Legs 361 and 362; support through USSSP and European sources for community workshops; support through the SSO for database integration of the proposal database and site survey databases.	Leg 361 addressed themes 1 and 2 and Leg 362 theme 3 and 4 of the science plan; our community workshop (on North Atlantic drilling) addressed the development of 3 new proposals related to themes 1 and 2.
	Access to new types of samples - expanding beyond continental margins	We've been able to tackle biosphere frontiers by joining forces with climate and ocean change.
	Samples from the core repositories facilitated research in to the role of continental shelfes on global biogeochemical cycles A revised seawater sulfate oxygen isotope record for the last 4Myr S Markovic, A Paytan, H Li, UG Wortmann Geochimica et Cosmochimica Acta 175, 239-251	The role of seafloor microbial processes in modulating the global biogeochemical cycles -> Biosphere frontiers
	deep drilling access to oceanic crustal samples about which we know little	They address deep biosphere objectives, limits of life, deep carbon cycling
	Post drilling seafloor observation platform and logging	all the themes
	cleaner sampling techniques, new tracers	make it easier to obtain high quality samples for deep biosphere work
	"Cleaner" drilling, use of microspheres for contamination tracking	Allows us to more accurately assess biosphere explorations, i.e. by determining if samples are likely contaminants.

Biosphere

Further exploration of the deep biosphere and controlling factors.	Identifies new taxa present in the subsurface, new places where life exists, new strategies for survival and proliferation.
Primarily Microbiological and deep biosphere related	
--Access to core samples samples with a multiple strategies to track drill fluid	
Cold seep exploration, deep coring for bio	Nutrient fluxes, trace gases
Including Microbiology and Biogeochemstry in the drilling. Allowing work with 'live' samples on board.	
	It address the research on 'deep life'. We know the deep subsurface holds the largest microbial biomass on Earth but we are still far away of knowing its nature, structure and activity.
Interest in microbiology	more MoBio samples
In theory, the JR100 program.	Once the JR100 program is open for proposals, it should allow projects that address the themes but are achievable with more limited (shallow) drilling than a typical IODP project.
Advances in sample acquisition and long-term experiments for subsurface investigations, including advances with CORKs.	
Microbiology contamination testing techniques have improves vastly and have been implemented more readily and consistently.	
The developments facilitate by JR has aided in expanding the different areas of research regarding the deep biosphere. My specific project focuses on one specific topic, but will also investigate broader topics including microbial presence and relative abundance and their metabolisms. The research I will be conducting is a ground breaking topic within the deep biosphere and the new scientific and technical developments from JR gives me the opportunity to investigate it.	These new developments allow investigation of areas that would not be accessible or very minimally accessible. The four focus points listed in the Science Plan are extensive and encompass many different topics. The advancements made will aid in successfully exploring and analyzing these isolated environments.
Single cell culturing of deep sea sediments	This address the theme of the deep sea life and aims to answer the question of "What are the origin, composition, and global significance of subseafloor communities?".
new knowledges about the size of the deep biosphere, the life forms and the limits of life are continuously obtained.	
new knowledges about the size of the deep biosphere, the life forms and the limits of life are continuously obtained.	Subsurface microbiology obviously needs a microbiology lab on the JR
half-stroke HPC	better recovery of semi-consolidated sediment, which has always been a major problem. New tool massively improves our ability to recover uncontaminated cores
Clean sampling for microbiological analysis	This was to my understanding a key task in the science plan
Probably the most exciting to me has been the identification of fungi in the deep subsurface - I would not have predicted that, and would certainly like to see these investigations continue.	This adresses Challenges 5 and 6, and perhaps 7, although it would be a stretch to relate any proven fungi found now to conditions that might have prevailed when they were buried. That relatively complex life can apparently exist at depth is really something new.

Climate and Oceans

I work on paleoclimate, Paleocene through Miocene. Without new paleoclimate/paleocirculation data, my work stops. More data has been collected in the past 4 years (for example recent data collected in Labrador Sea) which will help understand glaciation at the Eocene Oligocene Transition.	These data tell us about how paleogeography and carbon cycles affect climate through earth's history.
The technical developments in Advanced Piston Coring to greater depths than previously available.	The core recovery on the JR is amazing. Long (greater than 400 m) APC records allow detailed investigations of paleoclimate at the sub-orbital scale. This level of detail was not possible previously. The records are providing new insights into climate variability and the response of the biota to climatic change.
km of excellent sequences with high potential for interesting studies	The improvement of the drilled records and the choice of key sites are a huge asset to the fulfilment of the challenges outlined in the science plan, and although hundreds of kilometres have been drilled, there are so many open questions, which can only be solved by analysing new high quality material.
Better ocean drilling capabilities -> more high resolution records -> better paleoclimate interpretations	Support the objectives in the climate and ocean change theme.
Recovering well preserved fossil foraminifera has allowed for the creation of robust sea surface temperature and CO2 records for the Cenozoic in the last 4 years and additionally helped determine the timing of extinction and speciation events in foraminifera, and their response to rapid environmental change.	The well preserved microfossils recovered from IODP sediments can be used to address all of the challenges in the Climate and Ocean Change theme.
Development and testing of proxies for past climate (e.g., pCO2, ocean temperatures, deep ocean carbonate chemistry, sea ice)	These are particularly relevant to understanding how climate has changed in the past, especially response to higher levels of pCO2, response of ice sheets, ocean response to perturbations
The first recovery of sediment in the gulf of Alaska has enabled completely new insights into the links between climate, tectonics and ice sheet development, which would have been impossible without the ability to drill deep into the surface sediments as well as have a multi disciplinary science party to take advantages of those. The recent South African climate expedition is also providing the first records to push through into times of human evolution, and will be critical for understanding the links between climate, environmental change onshore and the evolution of our ancestors.	They tackle questions of climate forcing and response, consider life in a world with higher co2 than today, and tackle questions of changing hydrology.
JR expedition 318 was key in planning and scheduling a mission specific platform expedition to go back to the area.	Climate and Ocean Change
high-resolution records of pre-quaternary paleoclimate	high-resolution records of pre-quaternary paleoclimate
I'm a paleoceanographer. The JR is our primary tool for understanding past oceans and the evolution of unicellular life. I cannot imagine a vibrant and active paleoceanographic community without the JR.	

Climate and Oceans		
	SEM facility onboard; use of XRF scanning data to revise splice	don't know
	Improved advanced piston coring provides complete core recovery.	Complete core recovery allow high-resolution records to be established which can then, for example, give insight of the impact of orbital forcing during a particular period in time or a specific region which in turn helps us to better understand the Earth climate system and to improve climate modelling.
	New ways to investigate the deep biosphere	Strongly!
	provision of sediment samples for novel proxy studies	elucidate ice-ocean-atmosphere interactions during major climate shifts in the Earth System
	orbitally tuned age models; integration data- earth system models -climate models	
	The development of the half advanced piston coring technique during Exp. 346 provided continuous and high-resolution records further back in time than thought possible.	Provides a more detailed record of monsoon variability. (Climate and Ocean Change Theme)
	Distance learning and teacher training methods -- especially community college level teaching	They can address all themes in the science plan
	XRF scanning of cores extensive pore water sampling	higher resolution datasets
	Long continuous sedimentary records that we can analyze to build (1) high-resolution age models of the Neogene and Paleogene, (2) scanning XRF to get long high-resolution chemical records, (3) collecting new good records of the Miocene and Paleogene	We need to understand both mean ocean state and climate variability under warm earth conditions--challenge 1 of climate and ocean change. The continuous records let us understand magnitude of perturbations and causes of natural climate transients.
	Explored the recovery of expanded deep-sea sediment 'drifts' in deeper time (the early Cenozoic) to enable high resolution palaeoceanography for the warm greenhouse climates of the early Cenozoic. This was achieved on Exp. 342.	This is already revolutionising the palaeoceanographic study of ancient climates.

Climate and Oceans

Over the last 4 years, the JR has continued to recover a huge number of precious sediment cores from previously underexplored regions of the oceans. Access to these cores have allowed our community to continue to push the frontiers of knowledge regarding paleoceanography, paleoclimate and paleoenvironment through time and throughout the oceans. Specifically, the multiple cruises sailed as part of the Asian/Australasian monsoon series (Exps 346, 353, 355, 356) represent an enormous opportunity to better understand this enigmatic, but societally very important, climate system and its stability during periods of global climate change. The data from these cruises are still being generated and written up, but initial results suggest we are on the cusp of a step-change in our understanding of late Cenozoic monsoon dynamics, by pairing together data from terrestrial and marine sections at unprecedented resolution. Many of the cores obtained by the JR over the last 4 years are record breakers in terms of both recovery and scientific importance. For example, during Exp 353 the JR recovered scientific cores from the Bay of Bengal for the very first time, which will allow us to reconstruct the past behaviour of the Indian monsoon in unprecedented detail. During Exp 363 the JR recovered a whopping 6,956 m of core, which is the most collected on one expedition since the start of IODP Phase II in 2009. The high quality of cores recovered by the JR, doubtless down to the great team of drilling engineers and support staff aboard, allows the scientists to apply sophisticated multi-proxy sedimentological and geochemical proxies which allow us to delve ever deeper into past climate dynamics. I am excited to see all the amazing science which will emerge from these expeditions over the next few years.	The insights into Asian monsoon dynamics that will come from analysing cores drilled during Exps 346, 353, 355, 356 will directly address Challenge 3 under the Climates and Ocean Change Theme: "What controls regional patterns of precipitation, such as those associated with monsoons or El Niño?". Specifically, cutting-edge geochemical analysis paired with more traditional sedimentological analysis of the high quality Pliocene-Quaternary cores from Exp 353 will allow us to determine past precipitation patterns associated with the Indian monsoon. Additionally, geochemical data generated from mid Pliocene cores from Exp 353 will also allow us to tackle challenge 1: "How does Earth's climate system respond to elevated levels of atmospheric CO2?", as the Pliocene was a time of elevated global warmth and CO2 levels. Once the data is assembled and published, I anticipate great strides forward in our understanding of monsoon dynamics under past (and future) warming scenarios.
For the paleoclimate records, the improved drilling technology and the priority to duplicate and triplicate core is fantastic. The XRF core scanning is great for correlation.	Help to address these times of climatic change in high resolution.
Modernization of the JR helps with processing core, core recovery, etc.	Modernization of the JR addresses all themes in the Science Plan.
New modeling studies of sea level projections under different emission scenarios (DeConto &Pollard, 2016, Nature). The modelers used paleoclimate data collected on Pliocene IODP core intetvals to test their ice-sheet model for a warmer than present climate.	This development addresses challenges 1 and 2 of the Climate and Ocean Change theme.
Improved coverage of sediment archives in the Indian Ocean to better understand the monsoon and the overall geological/biogeochemical evolution of the region with global links. Also, the utilization of the half-APC coring tool to improve paleoceanographic records.	These developments provide progress in addressing Challenges 1, 3, 4, 5, 7, 10, 13, 14.

Climate and Oceans		
	In the last few years, since the JR's voyage into the Indian Ocean, there will be a myriad of research that comes out which will reveal unparalleled information about the history of the Indian monsoons. There is a CRITICAL need to characterize and advance monsoon theory in light of future greenhouse gases, and this facet of JR research will undoubtadetly yield important constraints on this climatic phenomena.	These new developments touch upon EVERY SINGLE challenge proposed in the Climate and Ocean Change theme.
	We made some major advances in characterizing and timing major climate shift in Antarctica, and as a results, we now have a better constrain to understand what triggers ice sheet melting. ICCP predictions have been improved thanks to ANDRILL.	See above
	XRF scanning at TAMU	Non-destructive high-resolution chemical records that can facilitate stratigraphic correlation and provide important geochemical data.
	Drilling high-accumulation-rate deep-sea sediments (contourite drifts) is what brought me into the program.	Constraining rates of change at a higher temporal resolution deeper back in time (i.e., doing Quaternary style paleoceanography on pre-Quaternary sedimentary records).
	A portable SEM has been installed on the JR microscopic room. Line image scanner in sedimentology lab.	Work good enough with high cost performance compere to other expensive tools.
	The new infrastructure on the JR enabled the retrieval of a series of cores for high-resolution sedimentologic, stratigraphic, paleoeceanographic and climatic analysis that otherwise never ever could have been obtained.	See challenges 1 to 7.
	Shipboard biostratigraphy continually refines the placement of foraminifer marker species and the geographic extent of species.	The evolution of species and their geographic extent over time allow us to track the changes in environmental variables that cause speciation and migration. For example, knowing that PETM excursion fauna first appeared on the shelf would document that the initial effects of climate change were felt there and not in the deep sea.
	Timing of the reopening of the Mediterranean following the MSC, Miocene Monsoonal chronology of the Indian ocean.	
	The refit was in 2009	
	Not sure but I love the desktop SEM	
	JR has GC-MS facilities, but was not available on board during expedition 354 where I participated.	Facilitate organic biogeochemical analysis.
	Shipboard lab equipment has been constantly improved enabling onboard up to date science	
	Imaging and photo systems; DESClogic core description system.	Better resolution for recording the core information.

Climate and Oceans

We have been able to develop tools for submarine paleoseismology and a better understanding of earthquakes and tsunami based on piston cores. If we succeed in our IODP proposal we will be able to extend the record of historic and pre-historic earthquakes into the past and therefore better understand the geohazard these events pose to heavily populated coastal regions such as Japan and US west coast	Directly related to geohazards and tectonics
Half-core APC has mad it possible to better recover that difficult interval where sediment is too stiff for full APC but too soft for XCB without severe disturbance.	Provide for undisturbed recovery of key sections needed for high-resolution time-series reconstructions of climate evolution
Research into siliciclastic and carbonate deep marine current controlled depositional systems.	
provided a lot of samples	provide suitable samples for the research
quantifying the rate and impact of past ocean acidification events. informed IPCC impacts and adaption report WGII	
half length piston core	deepen refusal depth for recovery of high quality drill cores suitable for magnetostratigraphic age control with full recovery
cruises in upcoming seasons in Southern Ocean will improve our knowledge of that region, and connections to planet	
introduction of a hand held XRF scanner - very useful for hard rock legs	see above
Recovery of longer (deeper) piston core records using the half-length piston corer.	Better quality paleoceanographic archives for addressing questions under the Climate and Oceans theme.
Taken high quality sediment cores to address major scientific questions related to the (paleo)climate sciences.	Taken high quality sediment cores to address major scientific questions related to the (paleo)climate sciences.
drilling expeditions in the China Seas and Indian Ocean	drilling expeditions in the China Seas and Indian Ocean
Being able to drill cores in shallow water (shelf) has allowed for the collection of sedimentary records that can capture both open marine and terrestrial conditions	I am very interested in the role of sea surface temperature on tropical and subtropical precipitation - being able to drill shallow shelf sites allows me to reconstruct both SST and continental climates (e.g. vegetation type, precipitation) from the same samples
greenhouse carbon cycle dynamics, biomarker proxy development and validation	How the earth and life system respond to warm and cool climate transients
JFAST drilling of the subduction fault off Japan provided material and structural analysis to understand shallow slip and seismic potential of the fault. DSDP/ODP/IODP material is integral to so many important papers in climate science and paleoceanography it is hard to pick out just one. A short list: Understanding past concentrations in atmospheric CO2 Neogene vegetation history in India, Africa, Australia Deconvolving the water d18O and temperature contributions to the benthic d18O record during the Plio-Pleistocene (understanding ice volume vs. temperature) Ahh. Will take a long time to compile this list.	Climate science: They provide fundamental descriptions for how the ocean-atmosphere-biosphere system is shaped by major events in earth history. This description tells us how sensitive these systems and their interactions are to perturbations such as rising CO2 levels and warming temperatures. They inform us how fragile or resilient the systems are and how we as a society should plan and adapt for future change. Earth in Motion: Scientific drilling through active faults (such as NantroSeis, JFAST and upcoming New Zealand offshore drilling) are shaping our understanding of fault processes and the seismic hazards associated with faults.
multiple platforms	multiple platforms

Climate and Oceans		
	In my primary field, for instance, identification of geomagnetic excursions in sedimentary profiles, based on high-quality studies (see Channell (2017) - DOI: 10.1002/2016GC006626)	Based on my first interest, such kind of developments may help to provide a more accurate chronological framework for the sedimentary profiles, in association to the biostratigraphy.
	Drill system increased recovery for sandy layers during recent JR Expeditions	Drill system increased recovery for sandy layers during recent JR Expeditions
	Improved stratigraphic frameworks; identification of environmental change threshold behaviour in plankton groups	
	Retrieval of sediment cores from Exp 361 that will allow reconstruction of paleo-atmospheric pCO2 over the last 5-7Myr.	This material will allow us to address challenges within the Climate and Ocean Change theme.
	Integration of seismic with core data for subfurface 3D modelling	
	On-board advances in instrumentation. Shorebased advances in archival (e.g. xrf scanners)	Give high resolution records that record and elucidate climatic changes, biospheric records, and stratigraphic connections to other earth processes.
	drilling in the North Atlantic to recover more sediments from Paleocene-Eocene hyperthermals	that allow us to investigate the effects of massive carbon cycle perturbations on climate and ecosystems
	Half-length APC. History of the Indian Monsoon.	The work that has been done in the Indian ocean directly ties in to the Climate and Ocean change theme. The Indian Monsoon affects billions of people each year. From coring throughout the Indian ocean, we will be able to understand (1) when the monsoon started/intensified; (2) how it is related to and influenced by global climate cycles, such as orbital forcing; and (3) how ocean currents play a role in the monsoon development.
	New data and samples to improve North Atlantic and Caribbean Climate.	New data and samples to improve North Atlantic and Caribbean Climate.
	Targeted expeditions to address key questions relating to past ocean and climate change.	They help us understand how the oceans functioned in times of past global warmth and through major climate transitions.
	found link the climatic changes and the human evolution	These new developments may help to illustrate the climatic influence on the earth's life and the ecological response from these lift
	I actually miss quite a few developments that should have been implemented but were not (e.g., XRF scanner, completely new phys prop lab with up-to-date equipment).	
	Expect to use results (and perhaps request samples) from the forthcoming Tasman Frontier and other NZ and Antarctic region cruises.	I'm primarily interested in the biogeography of land plants in the NZ-Antarctic region, so new knowledge of tectonic history of the Tasman Sea, and availability of pollen-bearing sediments will be useful.

Climate and Oceans

The ability to collect core with excellent integrity of the sediments has allowed us to push high-resolution studies, using isotopes, scanning XRF and other methods. On Exp 356 we were actually able to core to extraordinary depth using half APC, and then compare it to the same interval cored with RCB. Each method seems to have its own benefits and pitfalls, and the ability to utilize both records is fantastic. Similarly the new shipboard NGR allows us to compare core data directly with wireline, and will advance our correlation capabilities dramatically. Plus it allows us to fill in data in the upper interval usually lost to casing.	Climate and Ocean change require detailed, high-resolution records to allow for exploration of forcing and inter- and intra-basinal correlations. The ability to recover undisturbed sediments is critical to obtaining these. The ability to correlate between core and wireline using NGR provides an excellent framework mechanism for stratigraphic correlation for each leg, as well as making the fundamental correlations within and between regions.
Greater use of half-length APC coring has enabled recovery of sediments that we wouldn't have been able to recover so cleanly (or at all) before.	better core recovery --> more science
Online publications of latest reports provide rapid overview of key findings from voyages	Identification of key records that span key periods of interest for developing global datasets/networks.
Drilling in the NE Pacific has allowed quantification of the sediment fluxes from the active Pacific margin and linkage to tectonics. Development of high resolution chronologies at these sites has advanced our knowledge of paleoceanography and its link to climate.	Rapid sedimentation has produced a high resolution record that retains the interactions between glaciers, sea level, organisms, oceanography and tectonics in the past.
The JR has been capable of what I need for a long time (quality core), but our understanding of the geomagnetic field (in my case) is changing which is opening up new avenues of research. The key is keep getting high quality core, the tools will change and then we'll do more.	On this case magnetic stratigraphy could improve by an order of magnitude allowing much better dating which can address all questions.
A better understanding of the past environmental changes as recorded in the sediments. Several new biomarker and isotope systems, and an expansion of coverage in terms of sample availability.	They address climate and ocean change and biosphere themes by as these new techniques allow improved understanding of geological process, environmental conditions, and geochemical data.
Scheduled expeditions to the Ross Sea (Exp. 374) and Amundsen Sea (Exp. 379) provide a first opportunity to evaluate the response of the West Antarctic Ice Sheet to intervals of warm climate analogous to near-future predictions from sites that are unequivocally influenced exclusively by WAIS. (Although the ANDRILL MIS record and associated modeling suggests a very responsive WAIS, participation from the East Antarctic Ice Sheet can not be entirely ruled out due to the coring location.	Producing new records of WAIS behaviour from geologic intervals with elevated CO2 aligns directly with Science Plan challenges 1 and 2.
The 6.9 kilometers of sediment retrieved during the 2016 IODP Expedition 363: Western Pacific Warm Pool will advance paleoceanographic reconstructions of the Neogene climate at a resolution not previously possible.	The observations generated from the sediments recovered during IODP Expedition 363 will address the theme of Climate and Ocean Change.
Half Piston Core.	Incredible recovery of deeper records.
The US long piston coring could be cool if we actually get to do it - MGGs lack of support for survey work makes a frighteningly funny irony in how US folks actually can't use IODP - cut the German's off!	could be great - except our joke of a MGG program
The JR has provided lots of new data which I apply to my dissertation.	

Climate and Oceans

Not aware of what new technical developments exist. I would be satisfied with drilling with whatever is the best technology at any point in time. I assume that IODP implements new technology when they can.	??
Paleo ocean acidification	Deep time informed predictions of climate change and ocean chemistry
Trace metal analysis, stable isotope analysis.	Better our understanding of the geologic past.
Record of the recovery of life following the K-Pg mass extinction and Paleogene climate events in the Gulf of Mexico (Exp. 364). History of the Western Pacific Warm Pool (Exp. 363). Miocene sea level change in the Indian Ocean (Exp. 359).	These developments provide novel information about the resiliency of marine life to chemical and climatic change in the oceans, and the response of the worlds oceans to elevated CO2 and other chemical perturbations (Challenges 1,2,3,4,7)
Assessment of interaction of paleo-currents with sea level and climate	Address the scientific theme “Climate and Ocean Change”
New shipboard magnetometer, new magnetometer software. New orientation tools.	Allows for quicker characterization of sediment and a better understanding of the variability
Better micropaleo lab space; better connectivity with the paleomag and sedimentology areas. Improved scanning and imaging capabilities; improved shipboard resolution of cyclicity and event beds/lamina.	Improved resolution of processes and rates of past climate change
color and physical properties scanning measurements on ship	Provide a better first assessment of cores and initial stratigraphy
Relative Paleointensity as a Chronostratigraphic Tool on 1.5 Ma + Timescales	Provides new perspective on the timing and duration of past climate changes.
Amundsen Sea Drilling	
Any and all of the paleoclimate legs are crucial for understanding Earth’s changing climate through time. The focus on understanding CO2 and the climate connection through ocean drilling provides an amazing opportunity to understand where our climate system is headed.	Recent drilling efforts are focused on area’s that have an opportunity to address multiple research questions covering a variety of themes addressed in the Science Plan. I think the science plan is a great tool to link in your ideas for drilling with the JR community interests in mind.
Piston core (100m)	
Now offering the JR as a platform to drill short 100 m cores to increase use of the vessel.	Greater access to sediment core samples that will help address questions about co2 and climate, el nino and monsoon dynamics and much more.
Recovery of sediments that allow for the reconstruction of the Indo-Asian monsoon through time.	We can address how this important climatic phenomenon was affected by warmer periods in the past to better understand the sensitivities of the monsoon to warmer temperatures and resulting impacts on ecology.
Have not been involved in activities of the new science plan, as I have got an administrative position limiting the amount ouf time used for research.	See reply to 16.
Shipbased laboratories and their profomenace were exellent. To work with more than 30 scientists from the world was unique experince for me. 1. The multiproxy analysis on the Arabian sea sediment core samples from Site U1457 suggest stronger detrital iron in Quaternary. This indicated wetter climatic phases.	

A large part of the sediment cores studied worldwide for past climate reconstructions was drilled by the JR. Only a scientific drill ship such as JR can gather the kind of long complete sediment sequences, which are crucial to study Earth's climate evolution on longer time scales.	Science theme no.1 "Climate and ocean change: reading the past, informing the future" adresses JR's role as the ideal platform to study Earth's climate history.
Recovery of high-resolution sediment archives spanning past 25 million years of Earth' climate and ocean history	Continuous, well preserved, carbonate-rich sediment cores yield detailed reconstruction of high and low latitude climate change, contributing to a better understanding of main factors controlling climate evolution.
It has promoted the knowledgement associated with the end of the SCS seafloor spreading and magmatic composition evolution	the magmatic formation mechanism; the ending ages of the SCS seafloor spreading and so on
It started drilling the continental margins	Collection of new material to advance our understanding of, e.g., monsoon and ice-sheet variability.
It is to obtain successive drilling cores from the present to the deep time and to measure and analyze many types of physical and chemical property data of sediments on shipboard.	The new developments allow us to time-series data on paleoclimate and oceanography in high resolution. The resolution of the data and researches is getting close to the time scale, that human beings have spent their lives in. The paleoclimate data would be comparable with the prediction of climate changes during the coming 100 to 1000 years.
Using real data (sediment slides from under the ocean) to illustrate global changes over time as well as "how science works".	from front cover "disseminate results to the scientific community, in the classroom, and to the public. "
Atmospheric carbon dioxide reconstructions from multiple IODP sites using boron-isotopes	Identify Earth's climate sensitivity to CO2-based radiative forcing in the past
Half APC	Half APC technique has enabled the recovery of undisturbed, continuous, and deeper stratigraphic record, which is the most essential to reconstruct past changes and events in climate and ocean.
Recovery of material from critical regions to the understanding of the climate dynamics	
Access to study the paleoceanographic and paleoclimatic processes of the Iberian Margin	Assess the sensitivity of global climate and ocean ecosystems to sustained higher levels of greenhouse gases • Better predict the amplitude and timing of future sea level changes that may result from the disintegration of large ice sheets • Address how changes in ocean and atmospheric temperatures may influence regional precipitation patterns, and hurricane distribution and frequency • Resolve how the ocean responds to increased acidity, elevated levels of nutrients, and other chemical changes
The high quality microscope and cameras (specially SEM).	The allow a more refined studies of microfossils, and therefore a more constrained biostratigraphy on board (=better preliminary age models).
multiple unique and new sediment sequences from important Asian monsoon-influenced regions	Predicting future responses of monsoon system to climate change in these heavily populated regions
Provided information on past ocean change and thereby yielded invaluable boundary conditions for biogeochemical ocean modeling.	

Climate and Oceans

New Cenozoic high-resolution stable isotope records that serve as reference sections for the entire paleoclimate community. These deep sea cores have led to more precise and accurate Cenozoic time control, and contributed to our understanding of climate mechanisms operating between the global carbon cycle, ocean temperatures and ice volume. These discoveries have important implications for our understanding of current global warming.	
Improved shipboard core scanning and correlation facilities for hole-to-hole correlation at individual sites.	To improve the precision of stratigraphic correlation is one of the great challenges in paleoceanography, and hence in paleoclimate studies.
More accesability to samples from unique geological settings.	N/A
High resolution paleoclimatic time series in the Indian Ocean	New insight into driving patterns of precipitation (monsoons) offshore India and Australia
VCD, Label and data backup	Great!
Collected more cores from the Indonesian Throughflow/ West Pacific Warm Pool region, which relates to my research on El Nino, precipitation variability, and climate sensitivity	Collected more cores from the Indonesian Throughflow/ West Pacific Warm Pool region, which relates to my research on El Nino, precipitation variability, and climate sensitivity
XRF core scanners were installed in all core repository.	
Research into deep marine processes and depositional environments e.g. contourites	
non-destructive measurements by X-ray CT, XRF core scanner	super high-resolution reconstruction in climate change
New drills in strategic position to understand the Antarctic ice sheet past dynamics.	They perfectly fit with the Climate theme of the Science Plan
None so far, but I am hopeful that the Southern Ocean drilling scheduled and proposed over the next few years will lead to significant advances in understanding interactions between ice sheets and the global climate system.	The Southern Ocean drilling that is scheduled and proposed directly addresses Challenge 2 (How do ice sheets and sea level respond to a warming climate?) and will make important contributions to addressing Challenge 1 (How does Earth's climate system respond to elevated levels of atmospheric CO2?).
Recovery of high-resolution sequences for reconstructing past climate at millennial resolution or higher.	
Bugwin/bugcad counting and graphing software amazing	Makes collecting and communicating data much better
Better acquisition of piston cores for high resolution paleoceaonography	Better constraints on climate change and variability
Fantastic classroom opportunities for students. The available resources and the opportunity for webinar connections to the ship is inspirational to students interested in a career in science and more generally important in raising a positive public awareness of the role of science.	
giving access to sediment from deep burial depths	diagenetic reactions related to biogeochemical processes
Data repository Data Management and Information Services	
Improved coring capabilities; improved shipboard laboratories; improved data management systems.	
tool for correction of declination for APC	

Better petrology thin section imagery; new cryogenic magnetometer; non-magnetic core barrels	They provide modest but improved means to better select samples for shore-based studies; they allow us to use shipboard data to research the paleomagnetic inclination data from volcanic basement
I haven't been involved over this period	I don't know
Bay of Bengal drilling and new constraints on exhumation of Himalayas	Bay of Bengal drilling and new constraints on exhumation of Himalayas
science questions existed prior to 2013, although aspects of understanding were new	
Drill-in casing - this significantly decreases the amount of time required for drilling.	This largely affects Earth Connections themes.
- Improvement of Desklogic (data entry interface for visual core description). - Making the new hand-held xrf-scanner ready for routine operations.	Better rock description, better correlation of visual and core logging data.
The three Izu-Bonin-Mariana expeditions in 2014 have been extremely successful. First results have been published and many articles are currently in press/in review or in preparation. These expeditions contributed significantly to our further understanding of subduction zones (e.g. their initiation), elemental recycling through the Earth's interior and ultimately the formation of the continental crust.	They fit perfectly into the recent Science Plan.
- Portable SEM on-board - CCD cameras on the microscopes and its processing on the computers	Quickly specify mineral phases and micro-tectures of the rock core samples during expeditions. That helps a lot to integrate all data for the cores and boreholes. Then we could summarize expedition quickly and can start each post-cruise research.
Interdisciplinary studies of subsurface conditions in the oceanic crust	Directly link three themes (all except Climate and Ocean Change)
drilling into the lower crust (Site 1256D; Hess Deep, Atlantis Bank at SW Indian Ridge	implemented somehow in Earth connection, but a direct focus on the lower crust is missing
Acquisition of improved XRF core scanning facilities at College Station	The ability to acquire high resolution geochemical data from non-destructive analysis of core material
New data on the role of mantle flow & of lithosphere contribution to the composition of the volcanic crust (MOR & lavas emplaced during subduction initiation)	This research allow to improve our understanding of the connections between seafloor spreading, mantle composition and melting and the links to ocean crustal architecture (Challenges 8-9)
Recently completed triple leg in the IBM system (350/351/352) is poised for significant leaps in understanding of subduction initiation. A great, ambitious program of linked expeditions.	Directly addresses 8 - the recovered lavas yield compositional data on the upper mantle source. Directly addresses 9 - Exp 352 can argue for a role of early sea-floor spreading during subduction initiation. Directly addresses 10 - an array of alteration mineralogies were recovered. (Most) directly addresses 11 - the cruise can answer how subduction initiates and yield fundamental insight to volatile release and cycling through the subduction processes.

Earth Conenctions		
	Connection between volcanology, climate, tectonics on long time scales	They are mostly reflected in the three science themes Earth connections, Climate and Ocean Change and Earth in motion, although, in my case, no clear leading theme can be characterized. It is more the interplay of all three themes where my research is benefiting from. This connection between themes that generates sometimes a new research field is underrepresented in the current research plan and must be emphasized in my opinion since this multidisciplinary is something that IODP provides and is the big advantage to many other programs.
	It recovered a unique sample set (basement and cover) that is recording the evolution of volcanism and sedimatation after the subduction initiation and the evolution of the intra-oceanic arc-biasin systems in time. Without the JR this cannot be achieved anywhere on land.	The IODP Science Plan (2013-2023) theme 'Earth Connections: Deep processes and their impact on Earth's surface environment' set out to investigate the processes and interactions occurring between surface, lithosphere and deep Earth environments. Within this research theme, four challenges were set out, the most relevant of which is Challenge 11 (IODP, 2011, p.47): 'How do subduction zones initiate, cycle volatiles, and generate continental crust?' The new developments and rocks directly address these issues as JR provided the rock and the facilities to investigate and describe them.
	geochemical analyses	
	Paleomagnetic studies of rapid geomagnetic events (reversals and excursions). IODP-JRSO has recently purchased a new cryogenic magnetometer.	They aid in understanding how the geomagnetic field is generated, how plates and the mantle move, and how the geomagnetic field variations can be used for providing better chronologies, which are essential to nearly all IODP projects.
	Increased quantity of lower crustal gabbros available to the community involved in oceanic crustal accretion research. Increased understanding of subduction initiation via the IBM expeditions.	Understanding the processes of seafloor spreading has been a constant theme of scientific ocean drilling since DSDP was launched. However, we have limited basement samples on which to test models of oceanic crustal accretion, with cores drilled for this purpose representing only 3% of the total collected by ocean drilling. Therefore all new core samples, particularly from the lower oceanic crust, have the potential to yield exciting new insights into seafloor spreading processes. In addition, subduction initiation is the least well-understood (but fundamental) component of the plate tectonic system. The success of the three IBM expeditions has provided valuable insights into how subduction zones initiate, and the linkages between forearc processes and the production of ophiolites.
	Study of the lower ocean crust at Hess Deep Study of island arc initiation and marginal basin processes Study of detachment faults in the SW Indian ocean (with parallel study in the Atlantic via MSP Exp 357)	EXP 345 showed that the lower ocean crust contains layered gabbros, with new knowledge on melt-rock interaction processes, formation of MORB and cooling rates. (challenge 9). EXP 360 did the same for slow spreading rates, with the addition of high T deformation during spreading. Both those also address challenge 10 through alteration processes. Exps 350 to 352 and 366 studied convergent margin processes in the West pacific (challenge 11)

the main advancements have come mostly recently with drilling on the Sumatra and Marianas incoming plate and forearc. Time and post-cruise research will reveal the impact of these contributions, but preliminary information suggests that they both will advance geologic understanding.	Challenge 12 is the primary focus of this development, but advancement on Challenges 10, 11, 13, and 14 all contribute to this as well.
Interpretation of subduction initiation and how this relates to volatile cycling at subduction zones. I have been involved in measurement and understanding of volatiles and volatile flux at subduction zone volcanism.	Speaks directly to Challenge 11.
Hand-held XRF in the chemistry lab - speeds up obtaining compositional data that can affect drilling decisions. New development of drilling directly into hard rock.	This can potentially affect all science themes because it allows a quick understanding of the recovered core that could show that a target has been reached. This allows more effective drilling for scheduled expeditions. The effective drilling directly into hard rock demonstrated in the SloMo expedition has implications for other hard rock expeditions of this type.
The study of subduction initiation, infant subduction zones, and their linkages with ophiolite complexes. Sampling both the crustal (352) and mantle (366) parts of this system. Explores connections between active systems and those exposed on land. Also linkage between early seafloor spreading in nascent arcs and MOR processes.	These developments address all four of the major challenges outlined in Earth Connections: 1. composition, structure and dynamics of mantle, 2. seafloor spreading and mantle melting, 3. chemical exchange between crust-seawater, and 4. how do subduction zones initiate and cycle volatiles.
I'm actually not completely sure. I think there are more opportunities for imaging and scanning than there were, and the overall ability to collect, analyze, and integrate logging data might be better?	If there are improvements in these areas they would be fundamental for items in the science plan.
core imaging; half-core APC	core imaging; half-core APC
developments in lower crustal construction and deformation; developments in mantle flow processes	
Most recent 10 m.y. tectonic history of New Zealand and Australia's NWS are more complex than previously thought.	Earth Connections. The shallow mantle may play a more important affect on geodynamics than previously thought.
Integrated Expeditions on the JR has allowed us to conduct more comprehensive and integrated investigations of plate margin processes (geological, chemical, biological)	Integrated Expeditions on the JR has allowed us to conduct more comprehensive and integrated investigations of plate margin processes (geological, chemical, biological)
coring the dike-gabbro transition in the Pacific, and drilling hole U1473A in the Indian Ocean.	Deep drilling is the only way to recover the stratigraphy of the lower ocean crust and mantle.
	To compare past and present plate tectonics
Some sampling of lower crustal materials; geomagnetic records from multiple sediment cores	Drilling results have contributed significantly to our understanding tectonism/magmatism of slow spread ridge systems
It has advanced the discussion of how new subduction zones form	Earth Connections clearly identifies subduction initiation as a priority.
Early Cenozoic insights into carbon cycling, ice volume, and weathering.	
APC coring - high-resolution, high-recovery Quaternary sediments	allow for studying links (feedback) between processes on the Earth surface and the Earth's interior
Pressure core barrel, CORKs	Incremental progress

Earth Conenctions		
	1. We have been able to better date the age for the initiation of one of the major subduction zones in the Pacific, the Izu-Bonin-Mariana (IBM) arc. We have also been able to better constrain the tectonic context for this initiation and these new observations are starting to up-end our ideas on how new subduction zones initiate. 2. We have been able to discover a never before see pattern of tectonic subsidence on a passive margin (the NW shelf of Australia). What we have found is a nearly perfect pattern of 'reversible' tectonic subsidence and I think hat this was facilitated by a much more complete sampling of a tectonic process with the kind of sampling needed for studies of the climate (on the one hand) and a much greater focus on the paleobathymetry.	1. Development 1 above squarely address Challenge 11, How do subduction zones initiate? 2. Development 2 above squarely addresses Challenge 8, What is the composition, structure and dynamics of the upper mantle, specifically it addresses the dynamics.
	New insights into impact cratering (364).	Chicxulub drilling (364) addresses ocean response to chemical perturbation (4).
	Valuable new insight into subduction zone processes and hazards, ranging from how subduction initiates to the mechanisms that lead to giant subduction zone earthquakes. Also, a little peripheral to my area of expertise, but ocean drilling with JR has resulted in giant steps forward in understanding the limits of microbial life.	Using the JR to facilitate these developments has been instrumental in meeting the goals of the Earth in Motion theme by providing critical samples and data that can ONLY be acquired through ocean drilling.
	Better infrastructure	
	The role of mantle-surface water interactions and formation of serpentine is a huge new research topic - but little addressed to date by JR or IODP (Mariannas aside)	Embedded in Earth connections but may impact all other themes
	Ability to get continuous XRF scans of core. Quicker way to set re-entry cones and drill down the casing, leaving us more time to do coring and science.	
	Getting basement samples beneath the sediment and dating seafloor (in the South China Sea)	They address Challenges 8 and 9 in the "Earth connections" section: - Allow to constrain the deformation of the continental lithosphere and the driving forces for regional plate tectonics - Allow to constrain melting processes in a small ocean
	scientific: recovery of lower crustal samples technical: none, still challenge to recover fractured rock, after decades of trying.	provides new samples to address, e.g., composition of magma as it crosses the MOHO; impact of lower crustal cooling on hydrothermal fluxes
	From my perspective, there is not a lot new since 2013. The developing emphasis on the deep biosphere is exciting science, but it does not do a lot for my work.	I think the IODP should focus more on frontier areas where the possibility of dramatic results exists. As I see it the program is advancing and productive, but it is incremental improvements over time.
	Interaction between tectonics and climate	
	We are exploring the rift-breakup process of the South China Sea using the JR drilling expedition	It's the core content of "Earth Connections: Deep Processes and Their Impact on Earth's Surface Environment"
	It revealed the evolutionary history of arc evolution, which should result in the formation of continental crust. Also, the evolution of submarine caldera could be revealed only by drilling of submarine tephras.	It revealed the evolutionary history of arc evolution, which should result in the formation of continental crust. Also, the evolution of submarine caldera could be revealed only by drilling of submarine tephras.
	Better understanding of the origin and dynamics of Arc volcanism and mid-ocean ridge structure/composition.	Directly address challenges 8-11 outlined in the 2013-2023 science plan.

Earth Conenctions	Gained a deeper understanding of the South China Sea evolution and how it affected the paleoceanographic conditions through time. Recovered the first basement samples that provide the data gaps in the understanding of the mantle composition and dynamics in this region	The studies we did on the IODP samples recovered from South China Sea (IODP Expedition 349) gave us a clear connection between Earth's internal workings on the dynamics at the surface, as well as the impact on the past ocean conditions. This knowledge will help us understand the interconnection between deep Earth and ocean conditions at present..
	Drilling in non traditional areas, like back arcs and intra-oceanic arc volcanoes!	Earth connections....transfer of metals through the crust.
	evolution of oceanic crust	
	The last expeditions in the Indian Ocean supported my research dealing on "source to sink" processes and sedimentation in big fans associated with turbidites.	Turbidites represents a naturale archive of the past climate changes on Earth and they are investigated only partially. To collect new samples in different geological settings is related to a better understanding of climate change e its impact on people and their economy.
	Paleomagnetism of continuously deposited drift deposits feeds into next generation of magnetic field models.	It's not clear where paleomagnetism is supposed to fit in.
	The JR has created new ways of drilling to recover more sediment and reduce time needed to drill. A free-fall funnel was placed on top of a re-entry cone during exp 367 for the first time in IODP history to ensure the visibility of the hole. The JR is also drilling and recovering sediment that is deeper and harder to drill due to the technological advances and new ideas on the rig floor.	The themes in the science plan can not be addressed without technological developments in drilling.
	CORK-Lites	I just recently returned form Exp. 366 as a co-chief and the emplacement of screened casing at the summits of three active mud volcanoes on the Mariana forearc will provide sites for emplacement of CORK-Lites to allow monitoring of episodes of eruption at the mud volcanoes and determine the response to seismicity and whether variations in fluid composition, rate of flow, and temperature/pressure changes affect subsurface microbial populations.
	Database has improved a lot. HAPC coring system	HAPC coring system helps a lot for research on paleoceanography - climate and ocean change.
	Increased understanding of initiation and development of western Pacific island arcs/	directly addresses challenge 11
Earth in Motion	drilling/reaching the deep oceanic crust	the lower crust still holds keys to major questions regarding heat transfer in oceans near and far from ridges
	1) Collaboration with international scientists that would not happen if I did not have sailed. 2) Access to unique sediment and interstitial samples from the deep ocean floor. 3) High-quality onboard facilities to process and analyse samples that would otherwise degrade.	Very well.
	what happens within Recent ocean lithosphere is a key to reconstruct tectonic processes in the past, at all scales.	
	the understanding of subsurface landslides and how they affect/create Tsunamis (based on 1999 data, 2012 data and more data in the near future.	the understanding of subsurface landslides and how they affect/create Tsunamis (based on 1999 data, 2012 data and more data in the near future.
	downhole measturments	

Earth in Motion

Improvements in downhole long term monitoring via CORKs through associated instrumentation.	Improvements in long term monitoring instrumentation provide time series showing processes and connections between processes that illuminate tectonic processes.
Probe measurements, observatory installations	direct measurements and monitoring of conditions and processes in situ; collection of time series data
As someone interested in plate boundary evolution, the JR has sampled several margins around the world whose samples help us understand the crustal-scale processes involved at plate boundaries from sediment provenance to volcanism to frictional properties and seismic potential to biological productivity.	These topics closely follow the themes in the Science Plan, linking global processes through detailed, disciplinary research.
I'm relatively new to IODP so I'm not familiar with things pre-2013-23.	
Understanding of gas hydrates on continental margins	Understanding of gas hydrates on continental margins
APC half-corer	Deeper complete cores capable of being spliced
Increased ability to constrain strength of materials and in situ stresses [young field for IODP, but advances are being made]	Need to understand strength and stress, and how they evolve to assess a variety of Earth processes especially geohazards.
I think the most important technical development is the HLAPC.	This tool allows deeper penetrations into soft to semi-lithified formations, with excellent recovery, for a variety of climate and ocean change problems.
Refined borehole observatory designs	Directly address Earth in Motion theme
Drilling up to the basement has been successfully accomplished in deep marine areas.	The composition, structure formed as a result of the formation of oceanic crust helps in understanding the dynamics of Earth's upper mantle.
Drilling in the Indian Ocean is now allowing us to really address the question about how monsoon evolution is linked to the development of high topography in South Asia	This both addresses questions related to the evolution of the solid earth as well as development of climate
More expressed interest in addressing geohazards in particular those generated by and at subduction zones.	Earth in Motion and Earth Connections
The JR allowed for the deep geophysical exploration of the forearc environment, a tectonic region that still has not been sufficiently investigated.	Understanding subduction initiation is necessary if we want to make progress in evaluating risk at this type of margins.
Core and in-situ stress measurements	

Technical developments - The ability to drill in casing and reentry systems facilitating much more rapid operations, enabling drilling in difficult conditions and to greater depths, and enabling more science per expedition. Eg drilling in hard rocks and in deep sand-rich materials. - Improved core recovery in intermediate depths and materials using the half length APC (HLAPC) coring method. Scientific developments - Successful drilling of the Chicxulub impact crater site and understanding of the nature of the impact process. - Great progress in drilling the sediment record of the Indian Ocean and Western Pacific in terms of the history of monsoon development and links to large-scale tectonic exhumation and erosion. - Drilling related to regions of unusual subduction earthquake slip, e.g., Sumatra and, although Chikyu, Japan Trench. Important earthquakes that tested existing models occurred here in the last ~10 years and both have been drilled within IODP in the last 4 years to analyse materials that control the slip behaviour, with significant relevance for hazard potential elsewhere globally.	The technical development has contributed to several expeditions, including those that address themes of Earth Connections: how are seafloor spreading and mantle melting linked to ocean crustal architecture, and Earth in Motion: what mechanisms control the occurrence of destructive earthquakes, landslides and tsunami. Chicxulub is not explicitly linked into the current science plan. But monsoon-related drilling relates to Climate and Ocean Change theme.
Installation of simple CORKs	How do fluids link subseafloor tectonic, thermal, and biogeochemical processes?
Informed subduction initiation, arc magmatic evolution, and physical volcanology	
Covergent margin tectonics and volcanism.	
Please note, while I try to use information from the JR in my classroom, it depends on many factors (including the language abilities of my students and thus the quantity of units I can cover in class) as to how much I can utilize in any given year.	
Drill-in hard-rock guidebase that works	Permits easy and reliable access to exposed hard rock basement sites
recovery of in situ lower ocean crust	
better long-term monitoring tools, more advanced coring tools and protocols for biological samples, JR100 program, increased number of expeditions per year	Better coring and monitoring facilities certainly help with the themes Biosphere Frontiers and Earth in Motion allowing for more accurate and longer duration sampling. The JR100 program can be advantageous for all themes and allows flexibility in logistics and operations. The return to more funded expeditions per year is a benefit to all themes allowing for more time to be spent at sea studying the challenges outlined in the Science Plan.
Multi-disciplinary expeditions involving LWD, coring and borehole observatories e.g., upcoming Exp 372/375	Improve understanding of fundamental fault and subduction processes, with applied implications for seismic and tsunami hazard
Calibration of the handheld XRF by Axel Schmitt. Investigation of the drilling muds by Graham Andrews and Axel Schmitt.	The perhaps don't directly address them, but they are important to availability and interpretations of the data that we use to address themes in the science plan.
I like to think that there has been an increased understanding of fluid driven magnetic diagenesis, at least partly as a result of my work wth colleagues on Expedition 350.	They address Challenge 14, by quantifying the extent and influence of large-scale fluid flow below the seafloor and its effect on microbial systems, as reflected in authigenesis and alteration of magnetic minerals.

Earth in Motion

My field is primarily focused on geodesy and crustal deformation at convergent margins, with a focus on slow slip processes. In late 2017 and early 2018, the JR will be coring and logging the region surrounding the SSEs, and installing CORK observatories at the offshore Hikurangi margin to investigate slow slip event processes there. Although this expedition hasn't happened yet, this will result in huge advances in our understanding of what causes slow slip events to occur, which is one of the most compelling questions seismologists are grappling with today.	These expeditions exploring slow slip events at the Hikurangi subduction zone (Exp. 372 and 375) will directly address the mechanisms that control the occurrence of earthquakes and tsunami on subduction megathrusts. A second goal is also to look at the interplay between fluids and tectonic processes. Both of these are primary themes in the Earth in Motion portion of the science plan.
Successfully drilled serpentinite seamounts in the Mariana convergent margin. Despite difficult drilling conditions the use of half APC and XCB coring depending on conditions muds, rocks and porefluids were successfully and each seamount was left with a cased borehole ready for installation of CORKS in the future.	These developments allowed sampling for a range of analyses on cores to fully investigate the theme of "Earth in motion" through geological, chemical, physical and biological interrogations of recovered samples.
Better understanding of fluid expulsion from subduction zones (in particular their temporal variation) Not sure how much JR involvement: Much improved understanding of gas hydrate formation in particular in mudstones	- Fluid expulsion from subduction zones links directly into Earth in Motion and Earth Connections
Improving live webcasting	Has made outreach to various stakeholders a very rich experience.
Drilling in support of Slow Slip on the Hikurangi margin (upcoming expeditions 372 and 375)	Attempts to answer the question "What mechanisms control the occurrence of earthquakes"?
source to sink connections	understanding climate driven surface processes
Linking porepressures and sexual rates to deformation	
The JR's unique ability in installing subseafloor observatories is revolutionizing the types and quality of science that can be done.	Providing in situ access to fluids, chemistry, microbiology and subseafloor conditions that inform us about the Earth in Motion and other themes.
The JR has continued to improve its capabilities and success in many different environments. Convergent margins are particularly difficult, but the JR is up to the challenge more than anytime in its past.	Convergent margin drilling can include parts of all themes but especially Earth in Motion and Earth Connections due to the fact that the largest earthquakes happen at these margins, yet there are still many questions about how convergent margins initiate (which can be pursued with drilling and other tools). That said, some of the most interesting deep biosphere sampling has been done in the vicinity of convergent margins due to forced, large-scale fluid circulation that occurs in those environments.
I am a Federal researcher in methane gas hydrates. The JR, and the pressure coring technologies they have developed and plan to implement in the University of Texas Gulf of Mexico program, represent staggeringly large leaps forward in our ability to measure the physical properties of hydrate-bearing sediment.	Gas hydrates are an important component of the Earth in Motion theme, as well as the Climate and Ocean Change theme. Hydrates are inherently multidisciplinary, including biological studies, and could truly be connected with all four science themes. Most dramatically, hydrates contribute to Challenge #13, and a critical hydrates drilling leg is being proposed by the University of Texas for 2019/2020, as I understand it. The USGS anticipates being involved in that program.
deeper OBS	structural features of the earth

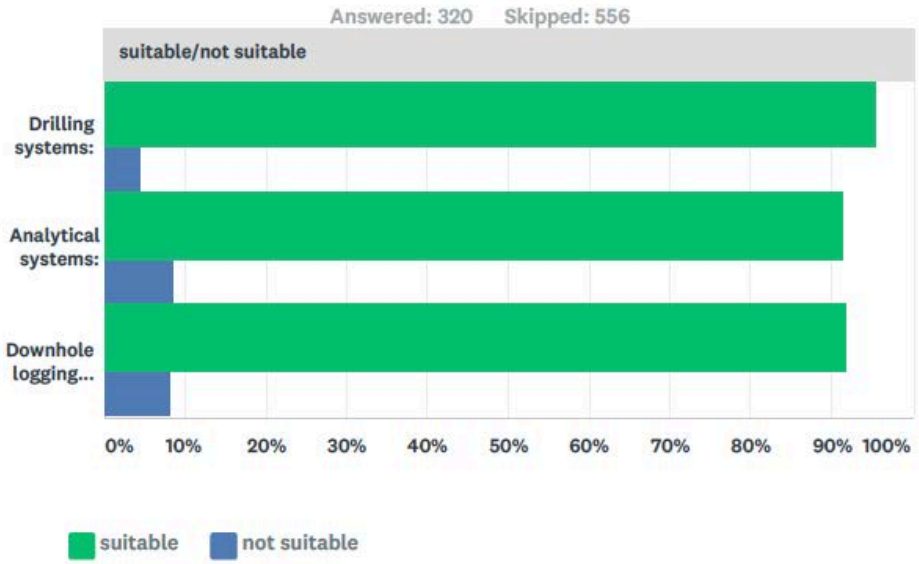
Half length APC	Improves recovery of samples from coarse/fine lithologies, which are critical to constrain subsurface fluid flow, with its consequences to geomechanical, geochemical and microbiological issues
FMS	Downhole imaging
Borehole measurements. Essentially applying tools from oil industry borehole analysis, where funding permitted. In some case making new tools not wiidely seen in industry holes.	In my interest areas these developments focus on bore-home monitoring that can lead to understanding of scientific processes, especially those associated with the movement of sediment-rocks and fluids.
gaining access to the deep oceanic crust	constraining heat transfer in the deep oceanic crust is part of the Earth heat machine and has an impact on global climates through times
instrumentation of the Tohoku earthquake slip surface	
Mariana's forearc, Sumatra subduction	Collecting new data and testing hypotheses about how tectonic processes happen at convergent margins
Advances in seismological technologies led to a better understanding of WHAT happens during megathrust earthquakes, however, samples recovered by ocean drilling play a crucial role to elucidate WHY it happens. Thus, IODP expeditions 334 and 344 advanced our understanding of the hydrogeological and mechanical responses to the incoming sediment at the Costa Rica margin and elucidated the difference between erosive and accreting margins.	Sampling of subduction zone sediments to investigate the cause for recent destructive earthquakes and tsunamis (e.g., Sumatra, Exp 362, Costa Rica margin, Exp 334 and 344).
Sumatra drilling results are just coming out, but appear to make significant headway in understanding how the incoming sediments may control the extent of megathrust earthquake ruptures, and hence also the generation of large tsunami. Upcoming Hikurangi drilling has huge momentum, and should produce further, critical, results.	Only ocean drilling can directly sample materials deforming in active subduction zones, and allow installation of seafloor and subseafloor monitoring equipment - critical to the challenge of understanding earthquakes and tsunami risk in coastal areas.
Scientific ocean drilling allows me to access, explore and analyze, geologic records that address the questions how our planet works.	They help better understand Earth's past and be able to better predict its future, and can address most important environmental issues today.
Discovery and understanding of Slow earthquakes	
In-situ strain measurements and geodesy,	Earth in Motion, earthquake hazards assessment, geomechanics
Better understanding of the recycling processes at supra-subduction zones.	In the Earth Connections realm, the increase in understanding of reactions involving fluid-mobile elements will aid in the determination of reactions between subducted material(s) and deep Earth processes.

18. The 2013-23 Science Plan contains 14 challenges, listed in the left hand column below. For each challenge, please indicate if within the next five years you are:

Answered: 729 Skipped: 147

	(a) interested in proposing a drilling expedition	(b) interested in proposing a planning workshop	(c) interested in sailing (or having a student sail) on an expedition	(d) interested in requesting data or samples from an expedition	(e) interested in using results in your research from an expedition	(f) this challenge is not related to your work	Total Respondents
1. How does earth's climate system respond to elevated levels of atmospheric CO2?	13.64% 94	10.74% 74	39.04% 269	37.16% 256	44.12% 304	33.82% 233	689
2. How do ice sheets and sea level respond to a warming climate?	11.44% 78	10.56% 72	33.72% 230	34.02% 232	42.23% 288	37.54% 256	682
3. What controls regional patterns of precipitation, such as those associated with monsoons or El Niño?	8.11% 54	7.36% 49	24.47% 163	25.83% 172	34.08% 227	50.00% 333	666
4. How resilient is the ocean to chemical perturbations?	8.68% 58	7.04% 47	23.95% 160	28.14% 188	36.53% 244	45.81% 306	668
5. What are the origin, composition, and global significance of deep subseafloor communities?	7.13% 46	5.27% 34	14.11% 91	13.18% 85	24.65% 159	62.79% 405	645
6. What are the limits of life in the subseafloor realm?	6.52% 42	4.66% 30	12.73% 82	10.25% 66	21.58% 139	67.70% 436	644
7. How sensitive are ecosystems and biodiversity to environmental change?	9.59% 63	8.07% 53	24.35% 160	27.70% 182	35.01% 230	45.81% 301	657
8. What are the composition, structure and dynamics of Earth's upper mantle?	9.41% 61	6.64% 43	18.52% 120	14.04% 91	23.30% 151	62.19% 403	648
9. How are seafloor spreading and mantle melting linked to ocean crustal architecture?	8.02% 52	5.56% 36	18.52% 120	14.35% 93	24.69% 160	62.65% 406	648
10. What are the mechanisms, magnitude, and history of chemical exchanges between the oceanic crust and seawater?	7.02% 46	6.11% 40	17.25% 113	19.69% 129	35.88% 235	50.08% 328	655
11. How do subduction zones initiate, cycle volatiles, and generate continental crust?	6.94% 45	7.25% 47	21.30% 138	15.28% 99	27.93% 181	57.10% 370	648
12. What mechanisms control the occurrence of destructive earthquakes, landslides, and tsunami?	9.02% 59	7.65% 50	19.88% 130	16.82% 110	27.22% 178	57.80% 378	654
13. What properties and processes govern the flow and storage of carbon in the subseafloor?	7.56% 49	5.40% 35	19.14% 124	20.22% 131	34.72% 225	50.77% 329	648
14. How do fluids link subseafloor tectonic, thermal, and biogeochemical processes?	10.99% 72	8.09% 53	24.73% 162	21.07% 138	32.67% 214	49.92% 327	655

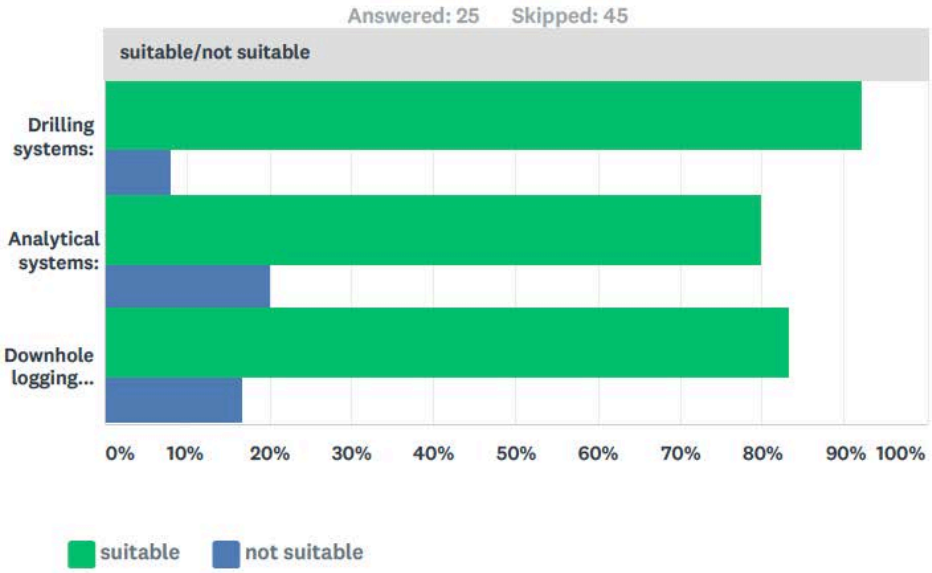
19. We are interested in your evaluation of the JR's capabilities for addressing the challenges in the science plan. If you have sailed on the JR since October 2013, please rate the suitability of the following shipboard systems to support your scientific research. Your answer should be based on platform capabilities (e.g., drilling and logging systems, range and capabilities of lab equipment), not operator performance (e.g., technician and computer support, catering). Please answer all that apply.



suitable/not suitable	suitable	not suitable	Total
Drilling systems:	95.61% 305	4.39% 14	319
Analytical systems:	91.51% 291	8.49% 27	318
Downhole logging systems:	91.94% 285	8.06% 25	310

Short answers by theme on next page

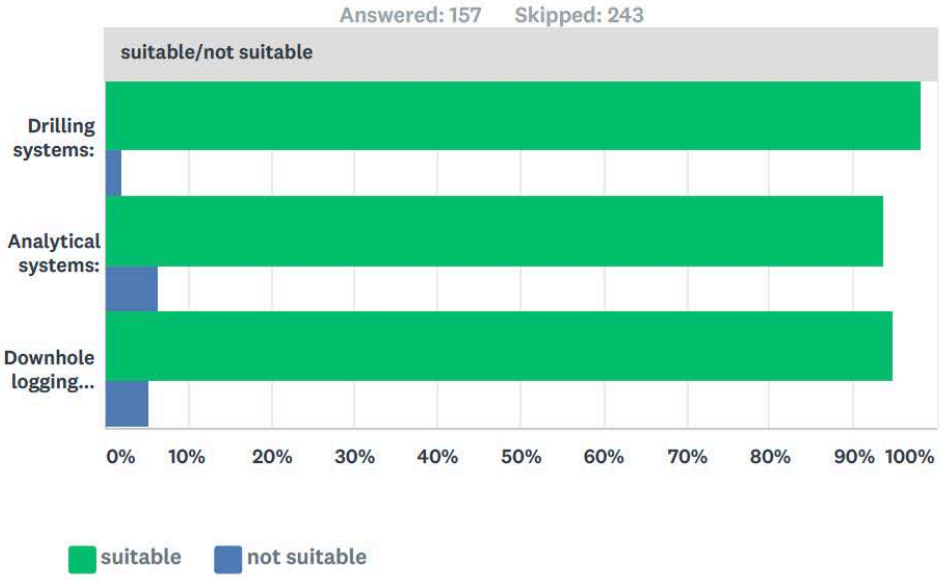
Biosphere Theme Only



suitable/not suitable	suitable	not suitable	Total
Drilling systems:	92.00% 23	8.00% 2	25
Analytical systems:	80.00% 20	20.00% 5	25
Downhole logging systems:	83.33% 20	16.67% 4	24

Biosphere
The systems have been great, but I would like to offer suggestions for improvement. 1. High temperature logging capability and fluid sampling (>90 deg C) would be very valuable. 2. I would further recommend additional shipboard microbiological analytical capabilities, including sterile sampling capabilities, bench-top flow cytometry, thermocycler. This would increase the productivity, data quality, and analytical turn-around time for microbiologists.
There has been a long-standing need for a downhole high res Mag Sus tool. This has been promised for years but has not been operational at typical depths for IODP work.
improvements in use of tracers for microbiological contamination are needed, as well as permanent laminar flow hood facility in lab
Need more emphasis on contamination controls!
drilling systems will be improved both with respect to quality and efficiency. Logging will be used much more applicable.
drilling is suitable and there is not much in the way of analytical systems onboard for MBIO, but this is ok given the nature of that work (largely post-cruise work)
I would like to see an X-CT facility
Hi temperature downhole logging with the capability to collect fluid samples above 120oC
Lab equipment for microbiological work is still rudimentary. Of course, most of the work is bag and tag samples. On the other hand we had limited freezer space (-80°C) available.

Climate and Oceans Theme Only



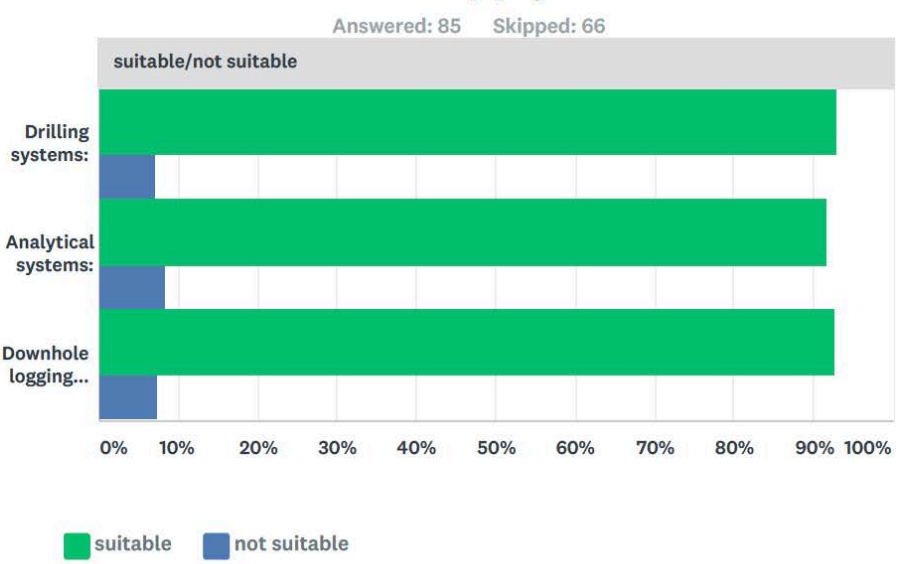
suitable/not suitable			
	suitable	not suitable	Total
Drilling systems:	98.09% 154	1.91% 3	157
Analytical systems:	93.63% 147	6.37% 10	157
Downhole logging systems:	94.74% 144	5.26% 8	152

Climate and Oceans
The JR capabilities are fantastic. It is a world class floating university.
Though all are suitable, there are limitations. In particular, logging tends to have patchy success in open holes in sandy lithologies. More widespread availability of LWD would help greatly.
excellent all around
From my latest experience sailing in 2014, nearly all of the systems on board the JR appear wholly suitable for the task at hand. The analytical facilities are generally very good, with the exception of the magnetic susceptibility track which was playing up during Exp 353 and produced quite a lot of artifacts and garbage data. I rarely use the downhole logging data and only one hole was logged during Exp 353, but I believe the set-up was adequate.
Very happy with lab capabilities. Notable exceptions (as of 2015) were serious problems with the SHMSL logger and the stratigraphic correlation software.
Technologies and more importantly mind state dating back from DSDP philosophy (why should we change something that brings rock to the deck?) is outdated.
The facilities onboard the JR are awesome but in some areas data hadling and input could be made significantly more user-friendly.

Climate and Oceans	
	Analytical systems and Downhole logging, are suitable but must be upgraded to meet modern standard. For Analytical systems: SEM should be updated and equipped with Secondary electron, EDS and CL; onsite XRF for systemic bulk rock chemistry, ideally on a MSCL track; a wider range of sieves in the micropaleontological lab and a colored lighting system for the sedimentological lab. Downhole logging: NMR logger is notably missing. Aside from the above, station ergonomics could be improved.
	Not sure about the logging, I personally always thought that a bit of a waste of operations time. The Chem lab is/was great but surely could do with some upgrading of equipment by now after the 2009 refit.
	The drilling system for a deep hole is limited, and the use of casing has the challenge.
	The new JR allowed for better drilling capabilities in outer shelf settings. Contrasting examples ODP Leg 174A and IODP 317 and 356
	My sense is that the move to co-locate logging and other operations is showing signs of improving a previously under-performing and expensive area of the program.
	However, I'm still not sure how well the JR can core chert-ooze sequences - sampling these sorts of sediments with some moderate to high degree of success would be very useful!
	Analytical facilities on the JR are overall outdated.
	I think that for some expeditions, the capability of the organic geochemistry laboratory could be expanded to include some basic GC work - for example, for leaf waxes and alkenones. Having an idea of the concentrations of these commonly used biomarkers during the cruise could be helpful in some cases (and on the Expedition I sailed on, there was some available time that could have been used to perform these analyses).
	GC-MS should be onboard
	If the program had to be trimmed, DM would be where I'd save costs.
	Downhole logging and vertical seismic profiles (check shots) are impotant for my work
	downhole logging systems need to be standardized and integrated into core records
	Some more elemental analyzing instruments are needed on the shipboard
	the ship needs an XRF scanner (period) also, I recommend a Geotek MSCL system to be comparable with other labs (the current system is outdated and has severe running and calibration issues) how about a tomography unit? I see that most medium-sized shore-based labs have already much better equipment that JR. That cannot be. The leading ship in research should have the best instruments. But you guys have no money or are not willing to spend money. That attitude needs to change. It does not make sense to spend millions to go to expeditions and then save on lab equipment. We need to take home the best and freshly gathered data possible.

Climate and Oceans	
	Some instruments on JR need improvement, such as SEM in core lab
	Get Candice to fund site survey work
	I have no idea what systems are available. My proposal is MSP and ECORD would probably approach Montpelier group for slimline logging tools. I don't know what they would do.
	a shipboard XRF core scanner would be really great
	Last time I sailed on a scientific expedition was in 2003 at the end of ODP, but I will be sailing with IODP on an upcoming Expedition.
	The JR has become a floating sediment core processing factory.
	I was very impressed by the use of the Half APC system in the recovery of otherwise impossible-to-core-well sediments.
	I left the Downhole logging blank as my cruise was short on time due to permissions issues. Though I have heard the logging system is great!
	A lot of laboratory equipment is not working during the expedition. Pre ordered solvents are not on voyage...
	For drilling, APC has been critical, along with high-res analytical and geochemical gear on the ship. I've not found down-hole logging to be particularly useful. OK, but not really worth the time or cost for most legs I've been on.
	Analytical systems are out of date by a couple of decade. Downhole logging relies on the quality of the drilling, and stability of the holes are quite random in sedimentary archive of past oceanic and climatic conditions
	Recommended additions: NMR logging tool should be added to the downhole logging arsenal, SEM needs an EDS, onborad benchtop XRF for rapid bulk mass analysis and improved ergonomics of workstations
	Drilling systems are truly superb for the recovery of paleoclimate archives, as are the new reconfigured analytical systems.

Earth Connections Theme Only



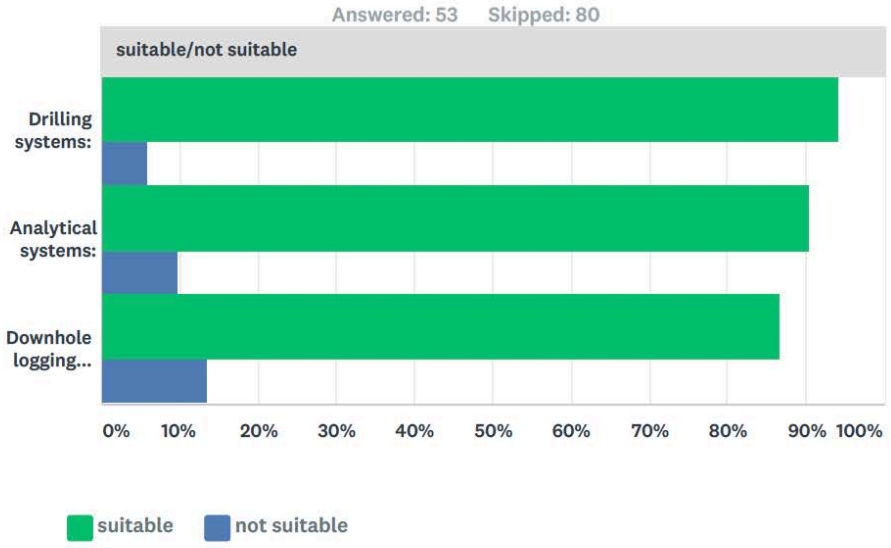
suitable/not suitable			
	suitable	not suitable	Total
Drilling systems:	92.94% 79	7.06% 6	85
Analytical systems:	91.67% 77	8.33% 7	84
Downhole logging systems:	92.68% 76	7.32% 6	82

Earth Conenctions
Recovery rates in hard rock legs has improved tremendously. Everything on board the JR is supporting the science I am involved and interested in. Diamond drill bits would however be a further improvement, allowing us to drill deeper with even higher recovery rates.
The drilling system is partly suitable. It is not quite suitable for drilling into younger ocean crust!
logging systems are suitable to good extent but a robustly clamped/decoupled (from heave/equipment vibration) seismometer is required for full set of questions to be addressed.
An energy dispersive X-ray spectrometer or mini-XRF system is needed for the shipboard SEM.
She is not stable enough to drill into deep hard rock holes. Borehole stability should be more studied detail, and proper variations of drill bits should be selected.
Need high temperture tools
The handheld XRF was barely functioning. Nor was the SEM. Need some way to quantitatively analyze chemistry of hard rock samples

Earth Conenctions
Near-ridge hard-rock drilling technology has proved to be a limitation over the years, and I hope IODP continues to investigate ways to make this possible.
I highly recommend to have in mind that the JR is already old and that one point a replacement or renewal of the old JR must be done. With a new ship, or extension of the old JR, implementation of a core CT could be achieved, which is something missing on the JR at the moment.
the difficulty in obtaining wireline logs remains a considerable problem, especially for holes drilled in tectonically active environments. A real breakthrough would be the development of a LWD system that can be deployed at an acceptable cost.
JR has excellent analytical facilities. An EDS on the SEM would be nice.
old drilling technology that needs to be updated
JR is a great tool for investigating my science.
additional support for vector magnetic logging would be useful
Would like better whole rock chemistry analytical equipment
an update of the analytical system would be great
Drilling systems and procedures are probably not sufficient at present to achieve ultradeep basement drilling: e.g. still using 1980s drill bit technology. Much more, and more frank, knowledge exchange is necessary between scientists, IODP engineers (US, Japan, ECORD), and people from a range of industries, including the geothermal sector.
The 2G Enterprises cryogenic magnetometer and inline alternating field demagnetizer used for analyzing archive half cores was not working properly during our expedition. After a low level of demagnetization (~30 mT), the cores would be acquiring a new magnetization rather than demagnetizing their remanent magnetization. This was likely due to the system itself not being properly shielded and was apparently a known issue prior to our expedition. I'm not aware if the system has been fixed, but this is a significant problem that should be addressed. This factor alone is not suitable in the analytical systems.
I would wish for better chemical analyses onboard (e.g. XRF). Much work goes into analyzing preliminary geochemical data on board that are of little use beyond the expedition report.
We still need a working version of the Diamond Coring System.
1. I think that drilling while logging should be enhanced and developed into a more routine system. The issue is two fold. First is time, logging is often planned near the end of a site and so if time is running out, then logging is often quickly dispensed with. Second, the condition of the hole quickly degrades and by the time logging is starting the hole condition and width are such that the logs are not very useful. 2. The JR could use more temperature probes so that more temperature measurements can be made while piston-coring. In the last few years there have only been two APCT-3 tools and more redundancy is needed.

Earth Conenctions
The question is odd as there is indeed a range between suitable and unsuitable. I would say that at 80%, all are suitable, but there is room for improvement: e.g. magnetic orientation of HLAPC, vibro-coring for sand, higher integration of drilling parameters data, isotopic analyses of pore water, grain size analyser, LWD...
Need hard formation drilling - improved bits (purchase of better quality down hole equipment). Ability and experience in casing deep holes Core logging is moving on quickly - need whole core CT scanning and continuous XRF for sediments and hard rock cores. May need high temperature tools for Brothers - has anything been developed since TAG, Middle Valley, PACMANUS pointed out these needs.
It would be nice to have a newer downhole imaging system (FMS/FMI) with 6 or 8 pads instead of 4. However I think such tools are too large (in diameter) to work with the JR drilling equipment. Also it would be nice to have newer rig equipment that would be still under warranty; the drawworks for example. I understand that a newer one would not fit on the JR due to space limitations on the rig floor; but it['s harder to accomplish our scientific objectives if there are delays due to rig equipment.
The JR has never developed suitable capability to drill and recover fractured hard rock. this has significantly limited the lithospheric community.
i'm looking forward to testing out the new magnetometer - it is hopefully a big improvement on the system i used on exp 355.
Deeper crustal drilling capability desirable. Partly a question of time allocated to such projects
Analytical systems: would be valuable to consider new/additional system for measuring velocity on cored materials, perhaps with variable P/T/saturation conditions Downhole systems: current systems still have challenges making robust measurements of temperature and pressure downhole (perhaps needs more engineering development, testing); more readily available logging-while-driling capabilities would open the doors for data collection in more challenging drilling environments.
The current means of obtaining whole rock compositions is inadequate and not up to the previous standard on the Resolution.
My research typically requires instrumentation that is not fieldable on a ship. For example, my work relies on high resolution mass spectrometry a clean laboratory.
The drilling systems are suitable, if antiquated. The analytical capabilities are suitable, though more would be better and I would note that Exp 366 was missing some of the more critical systems. The logging systems are suitable.

Earth in Motion Theme Only



suitable/not suitable			
	suitable	not suitable	Total
Drilling systems:	94.23% 49	5.77% 3	52
Analytical systems:	90.38% 47	9.62% 5	52
Downhole logging systems:	86.54% 45	13.46% 7	52

Earth in Motion
All systems are suitable, however APC should get improved for coarse grained units. See recommendations in Jutzeler et al. 2014 (G-cubed).
Although the analytical systems were suitable and very high-quality, some were not in operation when I was on board, e.g. the TOC analyser.
However the database needs to be stable through an expedition
I have tried to get support for vertical seismic profiling but was unsuccessful except for a single experiment from Chikyu
I say "not suitable" for drilling simply because recover for intrusive mafic rocks is relatively low thanks to challenges with current drilling technology and the hardness of the rock.
Need to make CT imaging and processing routine
Could improve on core recovery on the inbetween zones (i.e., those not APC or RCB worthy). Logging is continually problematic and overlooked/scrapped. More funds for LWD and more LWD will have a great impact in many drilling projects related to active processes.
The most serious problem concerns the ability to measure formation pressure and temperature.
As stated before, I do not do research myself, however the JR's capabilities seemed to be quite extensive to me, for everything mentioned.
We need better analytical facilities for hard rock geochemistry, particularly major element whole rock analysis; the present ICP-MS is unacceptable.
Logging is suitable if LWD available

Earth in Motion
The development and calibration of the XRF was excellent. The ICP-MS could be applied to more hard rock applications.
Some issues with state of readiness of equipment from time to time - e.g., Exp 350, where the ship sailed with only one fibre of the subsea camera cable intact, and subsequent failure forced abandoning of a site.
The JR has done alot with the available sysgems. But We can always improve on these. Money is always the limitation to more comprehive and suitable systems.
Drilling and logging systems should support logging while drilling and pressure coring for the proposal that aimed to be submitted related in geohazards, submarine landslides and tsunamis topic.
The JR offers a better baseline laboratory than many earth science departments on land and therefore must be maintained at this level of competitiveness
I hope Wifi would be possible.

20. What are the most important scientific accomplishments to which the JR has contributed since the beginning of this phase of ocean drilling, the International Ocean Discovery Program?

Biosphere
The discovery and expanded description of the deep subsurface biosphere has been an important contribution, eliciting greater public and funding interest.
i haven't sailed on JR since 2013
A key success was recovery of a superb East Africa paleoclimate record to tie into human evolution; this met a long standing goal (dating from ODP days) of using ocean cores to refine our understanding of human origins.
Paleoclimate, earthquakes, deep biosphere
training
Increased klnowledge of subsurface biosphere extent, paleoclimate information, plate tectonics understanding
Mariana Convergent Margin
The greatest number of expeditions JR has done. That is the most important contribution.
initiating a potential Moho hole during X360 was exciting and the JR has done an excellent job addressing paleoclimate objectives with the other expeditions completed during the first phase of the International Ocean Discovery Program
Exploration of deep biosphere
From my perspective, limits to life.
understanding interaction between crust and mantle. understanding monsoonal regime in different parts of the world
Definately drilling Ocean Ridge systems and Acreationary prisms
Discoveries of the deep subsurface microbial communities Discoveries of oxygen and other substances diffusing upward from reservoirs in the permeable Earth's crust into the overlying sediment package And many more ... Ocean drilling provides the only opportunity to look into Earth's deep past.
Improved understanding of the limits to life, and improved understanding of subseafloor community compositions.
There are so many. I am not a geologist, but I know that most of our understanding of marine sedimentology is a result of ocean drilling. As a microbiologist, I would say a big accomplishment is finding life in deep subsurface sediments and ocean crust.
Microbiology, biogeochemistry, and hydrology of the subseafloor, including the sediments and upper basement
Developing long-term records of Earth's history
I think some of the most important scientific accomplishments are the publications resulting from JR expeditions as well as pinpointed questions and methods for investigation of particular topics.
Being able to look at sediment cores from the Mariana trench and forearc
tectonic moving, fluid flow in the crust, and circulation, deep biosphere
Exploring the frontiers of the subsurface biosphere, for example in ultraoligotrophic sediments, mid-ocean ridge basalt and crustal aquifers
proving that up to 40% of the ocean floor is fully oxygenated down to the basaltic basement
Resolving earth climate in the past Resolving long-term carbon cycle Linking carbon cycle and microorganisms

Climate and Oceans
Paleoclimate
Many of the results from this phase are still being published, but highlights include: establishing Antarctic temperatures in the Paleogene (Exp 318), using a combination of marine and terrestrial proxies; determining variations in the Pacific carbonate compensation depth through the Cenozoic (Exp 320/321); documenting sea level changes (Exp 339).
Paleoclimate, especially monsoon history Convergent margin processes and related natural hazards
Chixculub Impact Crater Drilling, since it is one of the most exciting cores ever drilled linking all scientific challenges in the Science Plan
Too many to count. A selection from UK-IODP include: The Sumatra Seismogenic Zone – the role of input materials on shallow seismogenic slip and forearc development. Physical properties of oceanic lower-crustal and upper-mantle rocks from Atlantis Massif, Mid-Atlantic Ridge. The nature of the intrusive crust and Moho at slower spreading ridges. Greater understanding of South African Climates. New insights into Southern hemisphere climate change during Cretaceous OAEs. Providing Geological evidence for Late Pleistocene variability of the East Antarctic Ice Sheet. Expedition 364: Drilling the Chicxulub impact crater
Evolution of the monsoon (Asian/Indian/Australian) - numerous expeditions related to this
History of the monsoon, understanding of earthquakes, ocean crust-sea water interactions
Reconstruction of the Monsoon
I think across the board there is amazing science coming out of expeditions on the JR. Each year at our annual UK IODP expedition we hear about the latest expeditions in all areas of science, and they are always very exciting.
Understanding Asian monsoon - paleoclimate processes.
high-resolution records and a very good recovery
It has filled a fundamental gap in our knowledge of past oceanographic and climatic change in the indian ocean, a previously poorly studied area.
Monsoon history
drilling the monsoon records in the Pacific and Indian Oceans; drilling the Sumatra turbidite system
High latitude drilling - Arctic and Antarctic
understanding coupling between mantle and crust; monsoonal regime in Asia
Recovery of perfect cores during the Exp.361!
information on earth systems during changing climate
climate studies
so many results! it is difficult to reply.
Replacing poor quality early drilling with new high-quality sites that have both good recovery and much better and more consistent measurement of properties at sea. Identification of paleogene and neogene climate transients, placing them in a modern age model, and getting better geographic coverage of these time spans. Identification of subsurface sediment interactions with fluids and microbes and their implications to earth's chemical cycles. Better information about rates of sea level change and causes. Better understanding of subduction and deep cycling of chemical species/fluids.
Monsoon mission

Climate and Oceans
As outlined above, the recovery of a vast suite of cores that will shed light on the past behaviour of the Asian/Australasian monsoon is a huge accomplishment and will perhaps be the defining feature of this phase of IODP. The recovery of over 5000 m of excellent core material from the SE African coast during Exp 361, will also allow us to track the past behaviour of the Agulhas current at decadal to millennial scale resolution for the first time, which is a great stride forward.
Widespread studies in all the IODP themes, in the previously poorly studied Indian Ocean
Providing a wealth of detailed paleoceanographic and paleoclimatic records that are usable for many reconstructions.
The JR has recovered critical high-latitude climate archives that have provided much needed constraints for Earth System Models.
Vast expansion in paleoceanographic and tectonic records in the Indian and Pacific Oceans. This is leading to fundamental improvements in the understanding of the monsoon and tectonic evolution of seismogenic zones.
The advancement of research on subseafloor life, its extent and character, and ultimately knowledge on its controls would not be possible without the International Ocean Discovery Program phase. This is the most important accomplishment in my opinion.
Deep carbon.
High quality sections of the older stratigraphic record so that orbital cycles can be recognized with confidence. Some are using these to construct an orbital time scale for the Cenozoic. However, fundamental information about Earth's processes at different times and under different conditions reside in these records.
World wide drilling.
Deep biosphere
The response of ocean based sedimentary systems to past, present and future climate changes.
From a paleoceanographic point of view, recent years have resulted in a series of high-quality expeditions which will be able to answer scientific questions for years to come.
There is no single accomplishment, it's ongoing work in building an extensive data and sample set of the ocean sub seafloor is the accomplishment.
The Monsoon drilling was the most important in my mind
Illuminating Earth's climate history across many timescales; understanding global climatic processes; atmosphere-ocean linkages; rates and magnitudes of climate change
It allows deep sea drilling all over the world and reflected the true spirit of international collaboration.
The work in the SE Indian Ocean offshore western Australia is providing information about the initiation of monsoon weather patterns, ocean currents and wind patterns and how these interact. This area of the Indian Ocean had not been previously explored for climate purposes.
This is difficult to assess since it generally takes several years for the most relevant, impactful science to be published, at least with regards to paleoclimate work.
high southern latitude drilling
quantifying the rate and amplitude of climate change and its biotic consequnces in the best analogue of rapid climate change

Climate and Oceans
It is work in progress but orchestrated 'missions' (e.g. Indian Ocean; Antarctica) along sensible shipboard tracks will allow us to deliver something fundamental on the monsoon system, heat budget of the Indian Ocean and stability of Antarctic Ice sheets.
the paleoceanographic/climatic legs
Retrieving deep sea sequences from core monsoon regions
It provided a legendary chance for geologist to study the inside of earth or deep sea which previous technology would never have reached. It also bind scientists from different countries around world to collaborate together to solve some big scientific problem.
Cenozoic Climate Perturbations
Deepening the knowledge of globar warming
Most of the results of which I am aware from recent years have been from mission-specific platforms. Unrelated to my own work, I have heard a great deal about JR work in Hess Deep.
Increased coverage of previously un- or under-explored regions, such as the West Pacific Warm Pool. Higher levels of recovery and increasingly high resolution records for astronomical tuning.
ice sheet history, response of the earth system to elevated CO2 levels
--origins of the Izu-Bonin-Mariana arc system
I am not certain. There have not been many expeditions focused on Deep-Time paleoclimate and therefore I have not spent much time looking through what has been recovered.
It is, as it always has been, the most important Scientific Program for Earth Sciences, therefore there is a long list of scientific accomplishments
Too early to tell in my opinion.
Collection of sedimentary records from around the globe has been critical to enhancing our knowledge of how the Earth works and understanding the mechanisms driving long term climate change.
discovery of PETM, contribution to life's response to mass extinction and abrupt climate events, proxy development
interesting and important results have emerged from most of the recent expeditions, with high profile results coming from expeditions 341, 342, 343 and submitted manuscripts from later expeditions.
- Cenozoic CO2 and temperature trends - tropical ocean temperature gradient changes - meridional temperature gradient changes - climate and human evolution
excellent archives of climate change beyond the instrumental record
1. Given the exhaustive selection and proposal development within IODP, all legs make substantial contributions, usually to multiple areas of science, it doesn't make a lot of sense to rank such diverse activities. 2. Given 1, the Indian Ocean and Western Pacific legs are filling huge gaps in knowledge of tectonic, oceanographic and climatic processes, and increasing understanding of a region driving (in particular) climate changes in the near future.
Importance of deep biosphere. Tectonic history of continental areas.
I am a user of the collection of sediment cores that is already available. My analyses are lengthy and so far I have been able to find suitable sediments for my research in the repositories. Because I have not yet deleted the potential in all the cores that are available, I am not necessarily on top of all the new cores that are being collected - although I do consider everything that is available for my research.

Climate and Oceans
(1) Indian monsoon related research. The paleoceanographic legs have been exceptional and the combined efforts of the expeditions located in the Indian Ocean will make large strides towards understanding monsoonal variability and mechanisms. (2) The Sumatra cruise is already yielding high-impact results that have implications for subduction in that region and have important societal relevance.
CCD variation through the early Cenozoic and relationship with climatic changes
more scientific research focus and integration
to many (dinosaur extintion, Antarctic Ice Sheet development, Northern Hemisphere glaciation, reconstruction Pacific warm pool, cretaceous extreme climate etc). IODP has been instrumental in virtually all major discoveries.
We are now beginning to connect the Indo-Pacific legs, and make some advances in our understanding of timing and controls on monsoons/ climate systems. Comparison of detailed records around the perimeter of the Indian Ocean should elucidate controls, and help us better understand drivers behind precipitation and drought.
Understanding of the Asian monsoon and its changes through geological time; links to mountain uplift and long-term CO2 changes.
Drilling off the Antarctic coast to determine past stability of ice sheets.
In my opinion, high latitude drilling targets are important and any of these expeditions provide important new scientific knowledge.
1. For drilling conducted during this time window, I consider deep biosphere/microbiology contribution to be most important. 2. In my area of interest, integration of new core and new data from archived samples to understand carbon cycle perturbations.
Don't know, not much out yet. From Paleo perspective there is a long way to go for the results come in. We could probably to a better job of highlighting this.
So many things I couldn't possibly list them all. The amount of data alone is gigantic; the new hypotheses and models that result from this data is even bigger.
Regional drilling to address fundamental questions at regional spatial scales
too early to tell much ... not many data yet widely discussed past the preliminary reports ... but ramifications of Asian Monsoon results could be important for understanding leads/lags btw climate and what we believe to be the drives of climate change
Subduction zones, deep biosphere, climate records
Understanding the evolution of the Arctic, sub-seafloor biosphere, understanding deep origins of major earthquakes
Deeper understanding of system Connections and prediction capabilities
Long scale geologic climate records.
In the last 4 years there really haven't been a lot of good deep-time paleoclimate expeditions, other than the Chicxulub MSP. Most have focused on the Neogene sediments, and provided excellent records of changes in Neogene gateways, sea level change, and oceanography.
Solving the questions regarding the onset and variations of the Indian monsoon system.
Understanding the past context of how climate has changed in the past so we can more accurately put potential future change in context

Climate and Oceans
Every single drilling leg and expedition has provided multiple new discoveries and insights into how planet Earth works! The ocean environment is so vast; many more secrets about our planet's history have yet to be revealed. These points should be stressed in making the case about the scientific and societal value of scientific ocean drilling. Specifically, more and more short-lived regional to global events have been discovered; each provides valuable insights into processes of the coupled ocean-climate system, or how the biosphere responded to rapid events or perturbations.
Recovery of continuous sediment-based records of climate and oceanographic change.
New marine sediment perspectives that improved our understanding of climate and tectonic connection/evolution in regions like the Gulf of Alaska and Indian Ocean.
Mediterranean Outflow Water results showing the nature of MOW---additionally, the Shackleton legacy sites that were part of an APL
The goal of getting Pliocene sections to fill in gaps of knowledge on the interesting interval of geologic time that has broad applications to understanding our changing world. I do also appreciate the attempts for things out side of of discipline. The work on tectonics and drilling to the moho are crucial for our understanding the earth system and it is amazing that the JR and the rest of the IODP fleet of ships make these studies possible.
Understanding of ocean/ continent interactions
Increase the penetartion limit up to 5 km from the seafloor.
Improved understanding of spatial and temporal variability in tropical (monsoonal) climate in different areas of Pacific and Indian Oceans Improved understanding of warm climate dynamics through recovery of high resolution Neogene and Paleogene sediment successions
Monsoon related Earth Processes
the red layer, gravels and basalt in the South China Sea
Drilling the Bay of Bengal and South African margin
Demonstrating past greenhouse warming and ocean acidification
Paleoclimate and sedimentation has been very successful.
Freely sharing knowledge with access to all!
The dvpt of our knowledge on the deep biosphere
A series of Indian Ocean drilling for monsoon study.
Establish the chronology of the Mediterranean outlet following the MSC
Too early to assess. The study of drilled material takes years.
We have created a high resolution record of the past evolution of the Atlantic Ocean that will be crucial for a better understanding of the influence of ocean-atmospheric interactions on the evolution of climate change in the planet.
Last time I sailed it was prior to Oct. 2013, so I can not comment on the accomplishments of this phase.
Improved spatial and temporal coverage of deep ocean sediment cores available for pale oceanographic reconstructions, yielding diverse insights into global biogeochemical cycles, ocean circulation and climate change.

Climate and Oceans
As far as I can tell the fields of paleoclimatology and paleoceanography, particularly for deep-time paleoenvironments, would barely exist without the JR. These fields have answered fascinating and absolutely fundamental questions about the earth system, which are even more important in the era of modern climate change and public suspicion of models, etc. IODP is quite simply essential to essential to continued research in these fields.
Subduction factory Limits of the deep biosphere
upper crust dynamics K/T boundary
With the drilling of several expeditions in the Indian Ocean, the program will contribute not only to the specific scientific objectives of each expedition but to a regional knowledge. This will hold also true for South Pacific, the Antarctic expeditions and other regions the JR will be working on.
Orbital chronology for the Paleogene and Neogene
It's difficult to answer. Maybe is the South China Sea rifted margin.
better understanding of paleomagnetic field variability
A greater understanding of climate dynamics in deep time, especially during periods of high CO2.
via IODP expedition the scientists from different fields can work together to answer the puzzles of the earth and the sea
Cores from the Bering Sea help show how that region affects/is affected by the North Pacific and North Atlantic, cores from the Indonesian Throughflow/West Pacific Warm Pool region will help show how precipitation has varied, how SSTs vary with pCO2, deep ocean circulation
The new phase has started so recently that some of the scientific results are just being published and presented at scientific meetings. I am familiar with the results of Expedition 341 in the southern Alaskan Margin which has collected a ~6ma record of unprecedented detail of tectonic collision, uplift and denudation and how this balance changes in relation to climate; specifically the onset of the Northern Hemisphere Glaciation
understanding the earth system, promote the geoscientific research
I think the JR's work gives us a chance to read the records from deep ocean which provide a more comprehensive and broad data resoueces on global climate change and the impact of extreme events.
subsea floor life, polar climate
From my perspective - deep sea process and depositional environments
Drilling in major gateway regions such as South African Climate and Western Pacific Warm Pool
Drilling all over the world!
Investigating the global monsoon via several linked expeditions will allow us to understand the system holistically for the first time
Chicxulub crater was perhaps the most exciting expedition for the public to access although this does not make it the most important.
A mapping of the almost whole ocean
Understanding past climates in key areas (e.g. monsoon and warm pool) and with high resolution and a core quality rarely achieved previously for the last 5 Ma.
Providing key material to study the connections between planetary surface temperatures and atmospheric CO2 concentrations, as well as the way regional climate systems (including the cryosphere) respond to elevated CO2.

Earth Conenctions
Increased understanding of subduction zones and subduction initiation; Increased understanding of the formation of marginal basins and the continental rifting process; The influence of large ocean currents on Earth's climate, including droughts and monsoon activity
collecting paleoclimate data
The monsoon expeditions (especially the 354). The Indian Moho expedition (360).
Better understanding of continental crust formation and subduction initiation by drilling the three Izu-Bonin-Mariana Arc expeditions.
Findings concerning changing climate patterns in the recent past based on changes in near surface sediments Findings related to how subduction initiates, how intraoceanic arc volcanic edifices form, disintegrate
Further our understanding of subduction initiation
I do not know much about other discipline than the Earth connections, but in this field, we addressed the lower oceanic crust is very primitive to compare the upper oceanic crust (Exp. 345). This means the oceanic crust are highly differenciated in the layer, and that gives better understanding of the solid earth evolutions.
the access to the lower oceanic crust at Site 1256, Hess Deep and the Atlantis Bank at SWIR; providing samples;
IODP has continued the work of DSDP and ODP in providing unique sedimentary archives of a huge variety of Earth system responses to climate change
Too early to say
Beginning to understand seismogenic zones, in particular in the scope of volcanic, seismic and tsunamogenic hazards; how the climate evolved in the past as a major point to predict future climate changes caused by natural disasters and humans
The IBM expeditions are providing critical constraints on our understanding of how subduction is initiated. The paleoceanographic expeditions in the Indian Ocean are providing key insights in to the evolution of the thermal budget of the Indian Ocean and its role in the origin and evolution of the Monsoon climate system.
Drilling in the Western Pacific Deep backarc basins.
Sampling a complete section of oceanic crust at Site 1256D. Much of this happened in the prior IODP, but it has been a joint old and new program effort to penetrate all the main layers of the ocean crust. We now know the structure, composition, and properties of a layer that makes up 65% of the area of Earth's surface.
Recovery of a unique set of core samples from Atlantis Bank, SW Indian Ridge (Exp 360) that improved understanding of the accretion processes and lateral variability of lower oceanic crust.
Island arc initiation and marginal basin studies. High T detachment faulting at slow spreading ridges
Atlantis Bank lower crust/moho Chicxulub impact crater Atlantis Massif sub-seafloor biosphere Subduction Seismogenic zone
the biggest accomplishments are in paleoclimate because this is such a complex problem and the oceans are an essential repository of that history, and in microbiology of the subsurface environment, simply because this is such compelling scientific exploration research

Earth Conenctions
For my work legs 350-352 are paramount. I have been involved with data generation on some of these samples and it is yielding results that are key in understanding the role and cycling of volatiles during the onset of subduction.
The three IBM expeditions gave an unprecedented look at the subduction process. Expedition 360 was a great start to understanding the nature of the oceanic moho. Expedition 364 gives a unique perspective of the impact process and the extraterrestrial threat to our planet.
1. Confirming the Theory of Plate Tectonics, 2. Documenting the origin and evolution of island arc and back-arc basin systems, 3. documenting sea surface temperatures and Malankovich forcing Neogene and Paleogene sediments, 4. documenting the rift-drift history of passive margins and the dynamics of continental breakup, 5. revealing the structure and composition of oceanic crust, and how this varies in different ocean basins. 6. Desiccation and refilling of the Mediterranean sea.
subduction inception and arc evolution; Chicxulub recoveries;
Paleo-oceanography in relatively unexplored regions. Getting into the Indian Ocean, Alaska, etc.
A more serious investment in MoHole.
The recognition of a new kind of oceanic tholeiite associated with subduction initiation as a pervasive rock type in the western Pacific and Philippine Sea.
Drilling the dike-gabbro transition in the Pacific (Hole 1256D) Drilling the lower crust at Atlantis Bank (Hole U1`473A)
Actual lithosphere plate subduction and collisional processes, and to compare with ancient ones.
Advanced our understanding of how new subduction zones form.
plate tectonics and its drivers climate change, oceanic-seawater exchange begining to understanding links between Earth exterior and interiors
Installation of instrumented bore holes
1. Large impacts generating vertical fluxes and porosity increases (364). 2. Spontaneous subduction initiation (351).
Successful mantle (gabbro) expeditions, climate (monsoon) related expeditions, active thrusting environments, deep biosphere.
mostly incremental advances Haven't heard much about Indian Ocean / Himalaya drilling - but could be big results. Similarly - all the western Pacific Arc drilling
Lots of stuff! Here are a few of my favorites: 1. Slow spreading crust and mantle on eastern end of SW Indian Ridge 2. testing hotspot formation and fixity on Louisville Ridge 3. Study of Large Igneous Provinces (Shatsky Rise) 4. Oceanic core complexes in the Atlantic Ocean 5. A better understanding of the complexity of composition of young oceanic plates in 3-D
Study of ocean crust and structure of continental margins Discovery of deep biosphere Study of the monsoons
recovery of lower ocean crust north pond experiment
Online core data and descriptions from around the world.
drilling the oceanic crust
The continental margin drilling in SCS, the mid-ocean ridge drilling in Southwest Indian Ocean
Arc initiation
Better understanding of arc initiation processes (expedition 351).

Earth Conenctions	First ever basement sample recovery from South China Sea Recovering Earth's past climate records from the southern oceans. Understanding the mechanisms of subduction initiation and arc development Deep life
	Drilling other regions/areas, like arcs and back arcs.
	determining the structure of the oceanic crust
	To explore and share with a community of people an amazing amount of data. To store and preserve a real archive of sample avaliable for future analyses and studies.
	Drilling at the Dike-Gabbro Transition in the Pacific, and initiating drilling to Moho in the Indian Ocean.
	Most importantly the IODP has provided an environment for collaborative discovery that has led to transformative and societally relevant research and education/outreach opportunities regarding ocean science. Specific accomplishments by scientists using the JR include: (1) discovering evidence for the early environmental impacts of the period during which continents transition to ocean basis during break-up (Exp. 349) margin breakup and how ocean basis form, shedding light on the dynamic (natural hazards) aspects of continent to ocean basin transition episodes; (2) examining the fundamental processes of formation of continental crust on Earth (Exps. 350-352) by studying details of the Izu Bonin Mariana island arc system's crustal components along and across trike of these systems; (3) analyzing how monsoons respond to changes in the Earth's climate system over centuries to millions of years (Exps. 353-356 and 359) from both internal and external (from mantle to atmosphere) forces to help educate the public regarding climate models; (4) showing conclusively that repeated cycles of deep crustal injection of magma accompanies eruption of seafloor lava at mid-ocean ridges, thus adds considerably to our understanding of formation of the oceanic crust; (5) developing models using paleoceanographic data that explain aspects of ocean circulation patterns and data on distribution of different types of sediments to better define the relationship of these to Earth's climate on scales from thousands, to tens of thousands, to millions of years (Exps. 361 and 363); (6) discovering evidence for the widespread subduction of Pacific Plate seamounts beneath the overriding plate of the Mariana subduction zone, identifying the presence of seamount materials from the subduction channel in the mud flows that form large serpentinite mud volcanoes associated with vertical tectonic deformation of the Mariana forearc and establishing screened/cased borehole observatory sites for future monitoring of the relationships between seismicity at the Mariana subduction zone and its effects on cycling of subducted plate materials, mass transfer in the shallow to intermediate depths of a subduction zone and on the environmental conditions of subsurface microbial communities (Exp. 366).
	Drilling the Chicxulub crater to aid in better understanding of basin structure in the Gulf of Mexico and how marine life survived and recovered.
Earth in Motion	Deep biosphere research, crustal architecture
	drilling the forward region
	Paleoclimate study
	Permanent instrumentation in boreholes
	expansion of our understanding of sub seafloor fluid motion, live below the sub seafloor, earthquakes,
	Deep ocean crustal drilling. Stratigraphy of sedimentary sections. Sampling of subduction input materials
	Recovery of rocks and fluid samples from fault zones.

My familiarity with all the results from the JR are limited, however recent publications about the development of the Bengal Fan System and the implications for Himalayan evolution strike me as particularly important not only to one discipline but to many interrelated research pursuits.
The significance of a magmatic seafloor spreading at very slow rates stands out. The role if rifting in the development of ocean basins.
Important of mid-pleistocene in sediment flux to the oceans Key findings in monsoon history Wilkes land glacial history
Megaquakes.
Documentation, through multiple Indian Ocean expeditions, of the monsoon as a system. This "campaign" concept for the JR is new and very effective.
IBM: subduction initiation and arc/back-arc processes - challenge #11 Asian Monsoon - challenge #3
I believe that the rsults from both 362 & 364 will significant increase our understanding of the respective processes investigated.
Recovery of a long-duration erosion record in the Bay of Bengal spanning the onset of the Asian monsoon
Insights into Subduction Initiation
understanding the architecture of deep undeformed oceanic crust at fast spreading centers
- Records of monsoon - Drilling and sampling the Chicxulub impact crater - IBM forearc drilling
Upper plate composition, structure and tectonics within the Costa Rica margin. Izu-Bonin arc composition and arc crust formation.
ocean and climate history Magmatic and tectonic history of Earth Origin of oceanic and continental crust
I am most interested in the four expeditions to the Izu-Bonin_Marianas arc system.
To have a better knowledge of the oceanic crust, paleoceanography and paleoclimatology, geohazards (gas hydrates, larges earthquakes, landslides), fluid flow.
recovering subduction inputs to Aleutian Trench CRISP
Deep crustal drilling, Atlantis Massif, Atlantis Bank, Hess Deep, Superfast dike-gabbro transition have greatly improved our understanding of ocean crust architecture, and how crustal accretion differs with spreading rate.
Most important scientific accomplishments relate to climate science and seismogenic zones. Several expeditions were aimed at studying monsoons.
Too early to tell
Fromm EXP350, I would say the cycling of subduction zone volatiles and the evolution of continental crust.
This has only been a short period, but in my opinion the outstanding result would be the evidence from Expedition 350 for spontaneous initiation of subduction, a long-standing and contentious issue fundamental to the tectonics of our planet.
Plate tectonics, sedimentology of deepwater systems, climate change
Continued collection of fundamental data related to past environmental conditions on Earth. Advancing the quest for documentation of the deep biosphere Improving the capability for deep sampling of the lithosphere
Contribution to subduction initiation debate - IBM (Exp 352 and associated expeditions)

Earth in Motion	
	getting crucial samples; contributions to our understanding of climate change
	I am not familiar enough with the full suite of accomplishments in this phase, but I can say that the expedition that has just been completed in the South China Sea, and which will continue with Expedition 368, may be a keystone in documenting a new type of Magma-Poor Rifted margin. This will be a major accomplishment and success, even though it is at the edge of the ongoing Science Plan goals. Indisputably, the transition from rifting to seafloor spreading as documented in this new drilling, could be a new or expanded paradigm.
	Speaking selfishly, the contributions to gas hydrate studies, EXP311 being the most recent IODP leg dedicated to gas hydrates, began redefining how we approach the collection and analysis of hydrate bearing sediment vie pressure cores.
	New insights into deep-biosphere processes, including limits of life and on the complexity and relevance of carbon cycling pathways. Advanced and expanded models that tie properties of input materials to seismogenesis. Evidence for meteor impact and its consequences in Earth history. Comprehensive and integrated analyses of climate-tectonic connections in the Indian ocean
	Mantle rocks.
	Set the background for monitoring creep and earthquakes in seismogenic zones off New Zealand.
	Last paleoclimate and monsoon expeditions accomplished to record crucial data for climate change.
	gaining access to the deep oceanic crust in situ
	Understabding the motion of the Earth's crust and consolidations of marine sediments under different environments
	Better understanding of palaeo-oceanography and palaeoclimates, subduction initiation and processes, sediment source to sink, tectonic/stratigraphic evolution of several basins
	Plan expeditions with a focus on multidisciplinary stratigraphic drilling. Focused expeditions that aim to answer a single question of short-term interest are of limited long term scientific value to the scientific community and industry.
	Providing key samples and data
	Disaster prevention of earthquakes and tsunami
	There are new insights that hae not been found so far.
	Real time correlations of subduction zone deformation, microseismicity, slope failure, evolving sediment properties at subduction zones, etc.
	drilling the Messinian salt in the Mediterranean drilling serpentine ridges (exhumed mantle) on the Galicia margin dilling throught the frontal thrust and into the oceanic basement of the Nankai subduction zone

Biosphere

21. What are the most critical scientific challenges for the JR to address between now and 2023?	22. What are other potential scientific challenges for the JR to address between now and 2023?
Climate change research Deep biosphere research (taking into account reproducibility and replicability)	
Microbial diversity in the deep subsurface. And how anaerobic microorganisms relates to the geo-development of earth.	NA
getting to the MoHo	
We need more records of the Arctic to fill ot our knowledge of Arctic climate evolution; we need high-deposition rate records to go from mapping basic history to understanding climate and biological processes; we need better records of ocean biological productivity, linked to climate evolution, to assess how ocean ecosystems are linked to climate, particularly abrupt climate change and the dynamics of past warm periods that are analogs to the future Earth.	We need work related to sub-sea hazards, particularly submarine slides and volcanic eruptions that could impact human society; We have partial records of past climate evolution and there needs to be efforts to fill in our record of ocean history during the Cretaceous and early to middle Cenozoic to rise to the quality of cored records that we routinely have in the Pleistocene.
climate, earthquakes, deep biosphere	gas/oil reserves
Global Change, the role of subsurface microbial communities, extreme ocean states in the past and how they relate to rising pCO2	
moho	time
carbon cycling/CO2 sequestration/deep carbon burial and remineralization rates, subseafloor mineral resources	
More microbiology access	Lab space is very restrictive
Overall, drilling system is old fashioned.	Horizontal comparison of sample and data by the great number of expedition and the flexibility and mobility.
the Hikurangi Arc work is very exciting. making the leap from exploration to hypothesis based research with basement microbiology is within reach and promises to be exciting and transform our understanding of the deep (and global) biosphere	getting the next phase of drilling in U1473A will be a big challenge that hopefully pays off with a hole ready for the Chikyu to deepen to the Moho.
Origin of Amazon biodiversity (of course, it is what I am proposing:))	It would be great to better understand slope stability in tsunamogenic regions that have not been previously studied--e.g. Amazon slope.
More sterile drilling, faster seafloor to ship time	

Biosphere		
	Determine the depth of the biosphere in seafloor systems.	
	drilling deeper to reach the Moho climate system	
	Understanding and eventually predicting how the ocean and the entire Earth system has, is and will respond to climate change, increasing temperatures, increasing acidity, as well as increased levels of CO2 and other green house gases such as N2O. Understanding sea level rise and its consequences better. Understanding changing ice cover and its consequences.	Exploring and understanding the nature of the deep biosphere; the composition, structure and activity of deeply buried microbial communities. Understanding how they are formed and maintained and what their limits are. Understanding the geographical distribution of these communities. How do the communities in the ocean interior, the open ocean gyres, differ from the ones on the continental margins. What are their respective ecological roles. How do these vastly distributed microbial communities contribute to the global biogeochemical cycles of elements...
	funding	
	Better understanding of the processes that shape subseafloor communities, and their relationship to the surface world.	I have nothing to add here.
	Understanding climate change and defining the physical and geochemical boundaries for life	
	Getting new scientists involved in leadership roles.	
	Understanding fluid flow in the subsurface	Improve our understanding of the role of marine sediments in global biogeochemical cycles
	influence of climate change on the deep earth	limits of life in the deep, carbon cycling linking the deep to the surface
	To reclaim or maintain the initiative in fine-tuning drilling technology for unusual targets, in-situ experimental capability, and microbiological innovation	Make sure that the JR remains fully up-to-date for subsurface microbiology; broaden the scientific and proposal base in this field
	Visit more abyssal sites in the deep open ocean. These vast areas are still heavily undersampled and not well understood	
	Limits of Life and Deep Biosphere	
	Climate perturbation records	Hazards and resources
	Abrupt climate change and biogeochemical feedbacks.	
	getting more cores.	

Climate and Oceans

Climate and Oceans		
	We need to establish the sensitivity of various aspects of the Earth System to carbon dioxide variations, particularly during times when Earth was warmer than today. For this, we require sites with high sedimentation rates and both organic and inorganic pCO2 proxies. We also need to establish variations in high latitude processes such as ice volume and temperature changes, and how these are propagated across the planet.	Documentations of how ecosystems and the biota respond to climatic variations
	Ice sheet dynamics	Natural Hazards
	Studying times of past high CO2 or rapid climate change.	
	so many	so many
	Understanding past climate change events to enhance models prediction of future climate change.	
	To ensure that drilling legs attack high-impact, rather than specialist, problems. Paleoceanography of the Southern Ocean remains in the forefront.	
	Response of ice sheets to higher levels of pCO2; this is critical to better understanding what will happen to current ice sheets as pCO2 continues to climb and the Earth warms; upcoming drilling in the Antarctic/Southern Ocean is crucial to addressing this	In terms of societal impact, I think understanding geologic hazards (outside my area of expertise) are extremely important challenges.
	Processes of large-scale carbon burial during greenhouse climates, geological and climate history of the Arctic and Southern Oceans	
	We need to gather more direct information on the Paleogene and Cretaceous ocean and climate by sampling	More deep holes and down-hole logging to be able to extrapolate the information using seismic data
	Drilling more records from the Antarctic margins to understand the threat of ice sheet melting under warmer future conditions.	All areas listed in the science plan are very relevant and well thought out.
	Antarctic ice sheet history versus climate and sea level changes	other transects across the Antarctic margin and Southern Ocean
	Reconstructing past ice sheet dynamics.	Southern Ocean (especially Southern Pacific) paleoceanography; Southern Ocean and Arctic-Subarctic ocean gateway processes.

Climate and Oceans		
	The recovery of Pacific Sector Southern Ocean sediments will improve our understanding of ocean circulation and CO2 drawdown in this region. Additionally, the transit into the North Atlantic will provide us with the opportunity to complete missing links between the deep ocean and terrestrial records.	
	Antarctic climate history	Gas hydrates in Gulf of Mexico
	more expeditions related to the natural hazards	
	Ice sheet and sea level variability during past warmer-than-today climate phases.	
	Cenozoic paleoceanographic responses of the global ocean to growth of the cryosphere	Responses of the global ocean to waxing and waning of the Cretaceous greenhouse climate.
	High-latitude drilling to understand ice-sheet development/dynamics and ice-sheet ocean interaction through time.	
	global climate change	understanding slow slip events
	Good sediment corings in the Southern Ocean or near the Antarctica	
	recovery of complete sedimentary sequences (even in challenging lithologies) for high resolution studies	keep data collection/storage/data bases at high functioning levels; ensure shipboard data are made available in databases
	geohazards and climate change	carbon cycling
	Improved core recovery in variable lithologies	not sure
	constrain hydrology of the dee- and intermediate water masses at long time scale - impacts of CO2 cycle and bicarbonate construction.	
	High latitude ocean-ice sheet interactions in the past. We need to figure out how to get the JR into high latitude regions and how to improve recovery of these sediments	
	we need at least a minimum number of milankovitch resolving sedimentary records that are continuous for large stretches of the Cenozoic to understand how ocean circulation has changed and the processes that drive ocean circulation under warm climates.	Shallow APC during transits, with geophysical survey. The JR is actually cheap with respect to its capabilities.
	Integration of our drilling to fully understand the monsoons. Provide pale oceanographic transacts in the Atlantic of comparable resolution to the Pacific Transects	Drilling several Antarctic expeditions and integrating the results into a mission-type synthesis

Climate and Oceans

I'm probably biased by the field that I work in, but I think that continuing to focus on the information that we can wrestle from the paleoclimate record in order to inform future climate predictions is very important. Specifically the stability of major climate systems under higher atmospheric CO2 scenarios is an important question to tackle. This necessitates scheduling cruises that recover pre-Pleistocene cores, and covering the Eocene and older material at high resolution if we want decent analogues for the very high CO2 worlds of our near future. There should also be greater focus on drilling the higher latitudes, to better understand the stability of ice sheets under various global climate change scenarios. This is likely to require a combined JR and MSP approach to achieve maximum recovery in the wild and woolly Arctic and Antarctic seas.	I think the current IODP science themes are quite broad and do a good job of setting out the most important challenges of our time.
Better understanding the global questions that will be addressed through the planned drilling in the SW Pacific Ocean and on the Antarctic margin	Those being built into new proposals for the Atlantic Ocean, Mediterranean Sea and Arctic Ocean at present for the period from 2019 onward
Obtaining cores from (often remote) locations that to date did not provide good samples or encountered drilling disturbances.	
- how resilient have past ecosytems been to change? - how do tipping points in the climate system work? - it's also critical that we make sure that we communicate the results of this research at all levels. I also think that there is a huge amount to learn about the subsurface biosphere but am not an expert on this.	
Collecting high-resolution climate archives that address changes in climate and ocean on decadal-centennial time scales for past warm periods. Rates of change in ice-sheet and high-latitude ocean system are still poorly established.	Collecting paleoclimate records for the Arctic and the Antarctic that span the Eocene to Pliocene. Benthic oxygen isotope records suggest that the cryosphere was responding to variations in CO2, but only near-field archives at high latitudes can unambiguously record the variations in the state of the cryosphere.
Ocean Anoxic Events Cretaceous-Paleogene Boundary Project Mohole	Paleocene-Eocene Thermal Maximum

Climate and Oceans

Additional paleoceanographic records in the Gulf of Mexico and Atlantic Ocean and understanding of marine gas hydrate deposits.	Linking microbial processes and the influence of paleoceanographic and tectonic changes on the biogeochemical cycles affecting the distribution of microbial communities.
As mentioned above, I think that results from the Indian Ocean legs will certainly contribute to critical scientific conferences. Into the future, I think the JR can contribute greatly to research on ocean circulation and its relationship with regional rainfall patterns in the Atlantic basin.	High-latitude north Atlantic and Arctic drilling could become a high priority for the JR to address several scientific challenges including research on climate sensitivity, arctic tectonics etc.
Deep carbon.	OAEs
Response of the marine environment to decreasing Arctic sea ice.	
I think that getting into high latitudes and closer to the ice sheets is the next frontier. But I caution that drilling too close to an ice sheet may deceive us as depicted in a Far Side cartoon when the scientists are trying to explore an elephant using a microscope.	
Ice sheet(s) history, Paleogene/Neogene ocean circulation, land-to-sea sediment transfer in response to climate fluctuations	movement of sediment on continental slopes (e.g., hazards)
Drilling cores for Ice sheet dynamics analysis, high productivity area in the Indian Ocean	HPC drilling at an isolated slope basin to reveal recurrence pattern of M8 and M9 class paleoearthquakes and submarine active fault.
Climate Change	
A detailed assessment of the response of the ocean system to climatic and environmental changes. Will all biological systems survive the changes imposed on them?	Understanding deep-earth (biological) eco-systems.
Keeping the right balance between different challenges. Again, from a paleo point of view, many expeditions have taken place recently, and of course many more questions could be explored in the future. But the challenge may become to find enough suitable participants and following sufficient funding of working on the material.	As pointed at below, a more regional focus and partly opening of participants to outside member states who then even may partly fund the expeditions, may ensure high-quality participants for upcoming years.
Obtaining high resolution long scope record of high pCO2 periods.	Corning a Messinian and pre-Messinian record in the Mediterranean,

Climate and Oceans

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Climate and Oceans		
	In my field: past warm climates; tropical climate history; plankton evolution and environmental change; history of ocean acidification Outside my field: oceanic crust deep structure	
	Marine biogeochemical response to climate change.	
	funding post-expedition onshore research proportionally to funding expedition	
	To address all important scientific challenges outlined in the Science Plan, because many of those plans have not been implemented.	
	After the catastrophic Sumatra and Tohoku earthquakes and tsunami in 2004 and 2011, we know that these events happen on a much more frequent basis than previously documented. Our coasts are heavily populated and the risk is huge. It is critical that we address these problems through drilling with the JR in subduction zones such as the Cascadia margin, the and Japan, Sumatra, Chile trench. Another area of high risk is the Caribbean, we do know that earthquakes do happen such as the catastrophic Haiti earthquake in 2010 . The Puerto Rico trench has the potential of generating large earthquakes and tsunami. These areas should also be studied through deep drilling with the JR given the vulnerability of the Gulf of Mexico and SE USA coasts.	How to deal with hazards related to anthropogenic change such as increased storm activity, sealevel rise. The JR can explore the past record of storms and the results can contribute to future modelling. With the oceans warming, we should investigate the risks of melting of frozen gases to our coasts. Further investigate the risk of huge mass-wasting events in generating tsunami.
	In the most general sense I would rate establishment of rates and processes of sea level rise in the geological record as extremely important.	Recovery of sections appropriate to the reconstruction of the Miocene through Pliocene CO2 record.
	high southern latitude drilling	
	high resolution records to determine rates of environmental change and its consequences, going into remote regions which are critical regions for the emergence of impacts.	
	Hydroclimate variability in critical regions. Ice sheet variability under past high CO2 conditions Climate sensitivity to CO2 forcing.	CO2 sequestration

Climate and Oceans

	Have wide variety of standards on board to quantify results based on XRD and NGR. Also reliable instruments (e.g. SMSL, WRMSL and L*) need to be calibrated to give reliable data onboard
Quite a lot of research of JR's expedition is focused on the climate evolution and change. It could be affected by some countries' political circumstance. Funding or some relative policies which will be made may have an impact on the JR.	Whether the funding which is provided for some expeditions is enough and other countries' collaboration with JR's effectiveness due to the different management system.
Expanding the sediment/rock records from the S Indian and Pacific Oceans where there are few samples.	
Extinctions in response to environmental perturbations	Improve planktonic foraminiferal taxonomy
Glacial history and future potential change---- southern ocean desperately needs more drill sites.	deep biosphere
[1] Ice sheet stability, past sea level change [2] Stability of past warm worlds and limits of life in the oceans [3] Target sections with both marine and terrestrial fossils/biomarkers in to tie the two realms and understand linkages. [4] Target glassy carbonate microfossils to get the best possible estimates of past climate change	
Using key intervals in geological time to address and evaluate the effects and responses to a warming world (ie the current climatic scenario)	
vulnerability of the Antarctic ice sheet to ongoing and future warming (two scheduled expeditions) - drilling in Polar environments is a challenge but one worth taking on	continued efforts to understand the integrated climate system (ocean-atmosphere-land-biosphere interactions)
Reconstructing past pCO2 levels	Glacial/ice sheet history of Antarctica
those related to elucidating dynamics of high-CO2 climates.	Specifically, I'd say we need more sediments from Paleogene tropical regions and the Arctic Ocean
Not sure what the question is about, are you looking for priorities within those defined in the science plan?	

Climate and Oceans		
	Climate change - drilling sections targeted at understanding past warm climates that can serve as analogs for future conditions on Earth	Deep biosphere/deep sea research - we know little about these environments yet they are hotspots of microbial diversity. Getting sedimentary records from portions of the ocean floor that have not yet been investigated - we have little knowledge of some regions as they have not yet been drilled.
	changes in CCD, sea level response to warming climate	
	Continued retrieval of drill cores that allow us to characterize earth history (ocean, atmosphere, terrestrial and marine biosphere)	Ice sheet history Fault processes
	The Science Plan remains exceptionally relevant and we have so much work to do before in order to address the challenges laid out. Hazard mitigation in all forms, resiliency of ecosystems and environments, hydrologic cycling perhaps might be key, in addition to life in a high CO2 world.	
	The most critical challenges for the JR are to recover records adjacent to continental margins in the South Atlantic ocean to understand the relationship between continental margin evolution and ocean circulation. The opening and evolution of the South Atlantic Ocean has ultimately led to the current MOC configuration. Understanding the development of the current systems during that process will help us understand changes to the MOC under future climate scenarios. In addition, understanding the feedbacks and responses of the ocean-atmosphere-land interactions to different climate regimes and tectonic configurations during the opening/evolution of the South Atlantic provides the best opportunity to define boundary conditions most pertinent to future climate regimes.	
	- CO2 climate sensitivity - ocean acidification, ocean health - abrupt climate changes - sea level	

Climate and Oceans		
	We need to work on filling in some of our major gap areas. One is the teleconnections within the southern hemisphere climate system. We just got the perimeter of the Indian, but we're missing western South American and Africa (we got some on 175 but the calcium carbonate didn't survive), and of course the high latitudes are relatively unexplored (for obvious reasons).	
	The stability of the Antarctic ice sheets under warm climates. This is a topic where IODP can make a real contribution to understanding future sea level rise.	Long term history of CO2 levels in the atmosphere and the geological and paleoceanographic processes that control the CO2 cycle. Including ocean anoxic events, the relation to mountain building, to fluid exchange below the seafloor, etc.
	1. Determing the stability of West Antarctic Ice Sheet to past and future warming 2. Alignment to policy questions on impacts operating on human timescales	1. Following on from above, need highly-resolved (sub-centennial records for change) Arctic sea ice changes
	Drilling to determine the history and stability of Antarctica's ice shelves is a critical scientific challenge. These drilling targets are especially important in a world where climate is changing.	
	I would like to see work on carbon sequestration pursued seriously as controlled experiments. This is not my area of expertise however.	
	It the key to assess the stability of our remaining ice sheets and that needs to be a focus as we are at point where natural experiments can really tell us something.	Not in the books, but it does provide the only way to collect the materials to do a global experiment required to understand the geomagnetic field.
	Climate change, a better understanding of past Earth processes	Biodiversity, tectonics issues
	High latitude climate/cryosphere change	Collecting enough global data to inform earth systems models for time periods of distinctive change (e.g., Pliocene-Pleistocene)
	The JR is the only platform suitable for collecting long records from ice marginal settings that can help us pin down climate thresholds for major cryosphere destabilisation.	
	sharpening understanding (reducing error bars, convincing lay + political public of the existence) of the hazards posed by a warming world	

Climate and Oceans		
	Deep biosphere, climate, subduction zones (in order).	Although this is way out of my field, I think devoting significant time (several expeditions in a campaign mode, perhaps 5-6 expeditions) to getting deep deep crust is really important. And, no, I'm not Henry Dick or Jim Natland.
	evolution of polar regions and implications for current climate change, degree of climate sensitivity of the oceans, more on deep structure and relationship to major earthquakes,	
	ice sheet long term history	
	I have tunnel vision on this. We still have not obtained high-resolution climate records from LGM and many other intervals to show how ENSO, PDO, etc. change going into, within, and coming out of a full glacial or more minor MIS 3 extremes. This is generally an MSP target.	No answer. I am not focussed on IODP most of the time.
	Maintenance of funding to accomplish critical goals of understanding our oceans in light of human perturbations	Identification of impact of emerging contaminants on system
	Funding.	
	So many things. Here's one: Improved record of ocean deoxygenation in the geologic past. As the earth is warming, the capacity of the oceans to hold dissolved oxygen is decreasing, resulting in expanding OMZs and tropical low oxygen zones. It is critical to study changes in dissolved oxygen in the past through proxies to understand its natural variability, and the resiliency of marine organisms to these changes.	Increased drilling of older targets, including the Cretaceous and, where possible, the Jurassic. Understanding the development of the Cretaceous Greenhouse climate system would be a significant leap in our science, as would a better understanding of the early evolution of marine plankton like foraminifera.
	The cause of the onset of the modern climate system not just the high-resolution climate studies of the younger strata (Holocene- Pliocene). Would require to use other evidence than chemical proxies that are currently the only accepted measure of climate change.	
	Understanding past variations in earths climate	Support for post cruise funding and funding in the federal climate

Climate and Oceans

Coring high latitude records of climate change across a variety of timescales (i.e., the pre-Pleistocene record continues to reveal important clues to the dynamics of climate change associated with global warmth, and extreme warmth).	Continental margins provide important records of climate change at the interface of the terrestrial and marine realms. Challenges include shallow water on the shelf and potential zones of hydrocarbons or over-pressured strata.
Placing the current climatic changes underway in geologic context. How can IODP and the JR be used to better understand the scale of the issues today and the processes that are important to predict future changes.	
Understanding past ice sheet behavior to further our understanding of dynamic ice sheet responses and ice-ocean interactions.	Targeting expanded sedimentary sequences of past warm periods in environmentally sensitive regions
Climate-relevant transects to populate climate biogeochemical models	Hazards and risks analyses
Climate change and human interactions.	Sedimentary processes along shore. Tectonic margins that have potential for large Earthquakes.
I'm biased in saying this but I think paleoclimate records are crucial for the future of ocean drilling. Targeting sites that will illustrate ocean circulation changes through time will help not only with understanding future changes but will also aid in constraining models, which could always use more data to be improved.	Funding cuts seem like they could be a challenge in the coming years. Finding a way to keep the JR going and funded through this funding climate seems like a top priority.
response of the ocean and climate to higher CO2 and warming temperatures (includes the response of phenomena such as ENSO and monsoon systems)	
Understanding of the geological development of the North-Atlantic - Arctic gateway region.	
	Drilling in the Burmuda Triangle
Recover continuous, well preserved sediment archives of climate and ocean variability from the Southern Ocean and from the North and South Atlantic to better understand inter-ocean gradients, pCO2, ocean circulation and productivity changes through past warmer and colder climate phases.	Recover well preserved Cretaceous cores to unravel climate dynamics during Greenhouse climate modes.
Highlight and elucidate more information about the South Atlantic	Climate Change over the millenia

Climate and Oceans		
	If a second type of rifted margin different from Iberia margin exist	Subduction zone and backarc seafloor spreading of the west Pacific; East Asian monsoon
	High resolution records of sea surface temperature	
	Recovering material from unexplored areas of the planet that are relevant to climate change	Sub-seafloor communities
	Quantifying Climate and sea level sensitivity to GHG forcing	
	Ice-ocean interaction (especially glaciated or formerly glaciated regions) to assess ice loss during warming.	fluids and biota.
	Convincing people (public, students) that the data collected is REAL and can be interpreted logically.	funding
	climate change	climate change
	A series of Antarctic Ocean drilling to the deeper history.	Better integration of logging and shipboard measurement (cm-scale).
	Arctic climate, Arctic sea-ice, the instabilities of ice sheets in both South and North Hemispheres, and the causes for natural carbon dioxide variations on long time scales.	Changes in the biosphere, ocean chemistry, natural hazards, etc.
	High latitude studies	
	Help understand the link between carbon cycle and climate.	Help understand the mechanisms that regulate the ocean's nitrogen cycle and maintain ocean fertility.
	Arctic Ocean Paleoceanography	Black Sea Paleoceanography
	Budget cuts	More budget cuts
	As a polar scientist a believe a main challenge is to understand how ice sheets and sea level respond to elevated CO2 concentrations and temperatures	
	Understanding of the forcing factors of global monsoon systems	Orbital chronology for the Cretaceous
	Continued understanding of paleoclimatology.	
	Funding	Need more emphasis on stratigraphy
	Core recovery.	Drilling depth.
	Understanding climate change through the study of past climates	
	to find the new research field which is a combine between land/continental drilling and ocean drilling	to bring all youngest scientist in the one expeditions. or to purpose sail with the one subject, so all of the scientists are the same specialization with the crucial topic from the previous expedition has been down.

Climate and Oceans		
	Get more pCO2 and sea level records	More high-resolution records, more regions/cores focused on precipitation variability
	Understanding the geo-biological evolution of new born oceans (e.g. Gulf of California, Red Sea). Using laminated sediment core studies to reconstruct land and ocean climate at very high, decadal resolutions. This is a key to better understand past climate change at temporal and spatial scales that are relevant to future climate change modeling exercises.	
	Pacific cores, Arctic cores.	
	climate change and the biodiversity	biodiversity
	Arctic	
	Investigating past climate change to model for present and future climate change	As above
	Drilling in the polar ocean	Climate change in deep-time, eg, Cretaceous, Paleocene, Eocene
	Drill in Southern Ocean in places representative of ocean dynamics and ice sheet dynamics changes. This means, drill in places that are often sea-ice covered around Antarctica.	Go the Arctic Ocean, drill in different places and try to establish a timescale of Arctic processes, which is highly difficult so far because of the lack of fauna found in the sediment in general. So increasing the number of drilling might provide more robust results. Second challenge: drill the equatorial pacific to understand the evolution of the cold tongue, same for the equatorial Atlantic. The tropical cooling plays a critical role in both ocean dynamics and atmosphere dynamics, the location of the main currents and cells, which are in turn determinig the climate conditions.
	Challenges 1 and 2 of the Science Plan	
	Global climate and past earth history	
	To investigate millennial and orbital scale oceanic and climate linkages between the equator and poles via north south ocean transects, especially in the Atlantic	
	Document and understand the regional response of global climate changes under different boundary conditions	
	Public support and pressure for funding given the political climate.	

Climate and Oceans	Changes in climate and environment to warmer-than-today periods, especially ice sheet	better understanding inter hemispheric connections
	How the ocean regulating the global climate changes	to understand the evolution of continental and Ocean transition (COT) in typical sea basin, such as the South China Sea
	Link between geology and biology.	
	polar areas	getting sediment records covering until the present
	To improve spatial coverage and quality of temperature and pCO2 records from warm climates states; records of ice sheet stability; and the behaviour of marine biogeochemical cycles within warmer world conditions	
Earth Conenctions	Gas hydrate formation; understanding the link between southern ocean climate and North Atlantic climate via the study of a latitudinal array of drill sites through the South and equatorial Atlantic; a new and better understanding of the maturation of ocean crust and architecture along a tectonic flow line; True polar wander of the Earth by studying hotspots; influcence of large igneous province volcanism on earth's climate; better understanding of geohazards associated with marine earthquakes	Improved understanding of the biosphere in the ocean realm; improved understanding of the hydrogeology of the ocean crust
	drilling deeper into oceanic crust - eg superfast	Better core recovery in poorly consolidated rocks
	Probably to fulfill the topics listed under 4 of the science plan! Compared to the amount of sedimentary cores already existing to answer the palaeoclimate and oceanographic questions the material we have from the ocean crust especially from deep crust and very old crust is non satisfying.	
	. To sample a complete section through the oceanic crust away from core complexes (e.g. deepening the Hole 1256D). . To instrument a seismogenic/tsunamigenic fault. . To pursue the quest of a global understanding of the relationships between climate and Earth dynamics.	To contribute to our understanding of the Messinian crisis. . To document the deep structure of active hydrothermal systems.

Earth Conenctions		
	Drilling, coring (with good recovery!) and logging the active hydrothermal system at Brothers Volcano (Exp. 376)	
	Structure of the oceanic crust: Links between spreading rate, magma supply and magma storage.	Elemental cycling through subduction zones. Magmatic-hydrothermal links in island arcs, backarcs and ridge environments.
	- Pursue the challenge of penetrating the 5–6 km thick oceanic crust and directly sampling for the first time the underlying mantle from which all oce- anic crust, and much of the continen- tal crust, is derived - Decipher the record of seawater-rock exchange and quantify its role in global geochemical cycles of impor- tant elements such as carbon	What is the geological nature of the Moho and the limits of organic matters in the lithosphere? The assumpsions of the geological, geochemical, geophysical evolution will be significantly changed by the results.
	Structure of the oceanic crust; fluid flow within the oceanic crust; alteration of crust as it ages from ridge to subduction	
	a deep hole within the lower oceanic crust of fast-spreading ridges (EPR) and slow-spreading ridges (SWIR); coherent samples of cores are necessary for answering questions not solved since decades	
	The role of oceans in regulating the Earth's carbon cycle. This is effectively a continuation of what I believe to be the major success of IOSP/ODP/DSDP in the past. The evolution and effects of collision zone plate tectonics (both subduction zones and continental collision). There is growing realization that the best records of subaerial volcanic and tectonic processes associated with collisional tectonics can be obtained from marine sediments, and IODP is uniquely placed to obtain this type of material.	Preliminary results from IODP 370 (in which samples were immediately transferred by heliocopter to an onshore lab) suggest that microbial populations and activities may be significantly lower than previously measured in IODP sediments. I think more work needs to be undertaken to ensure that coring/drilling and ship-board sample handling techniques really do preserve in situ microbial environments.
	For the community to debate and decide	For the community to debate and decide

Earth Conenctions

We have to complement and afterwards synthesis the results of subduction zone research to recognize which pieces are missing for future (drilling)programs.	Overlapping research themes like the connection of volcanism, climate and tectonics must be studied more extensively aiming to understand the underlying processes and how they are linked to each other. These will lead to potential new drilling proposals with a brought acceptance in the different scientific communities and the public as well. Another challenge is to integrate and advertise more combined continental and ocean work for example in joined IODP and ICDP projects since investigation of some of the research goals don´t stop at the coast.
The scheduled Hikurangi expeditions are critical for understanding slow slip earthquakes.	Climatic evolution of the Southern Ocean and the response to the Antarctic ice sheet to climate forcing.
The drilling of the Moho mantle and the deep parts of the arc crust	deeper drilling
Climate change, hazards (earthquakes, landslides, tsunamis), and resources (petroleum and miner). Basically there will be a need to focus on societally relevant topics, while also learning about Earth's geologic history and evolution.	
Continuing the Slo-Mo programme in the SW Indian Ocean, leading eventually to recovery of the first in situ samples of upper mantle rocks	Providing insights into slow-slip earthquakes
Climate change and geohazards are probably the most critical points for the geoscience community to address; the JR can contribute to those both on a directly human timescale and by considering the underlying processes and materials involved, e.g., the nature of oceanic lithosphere and fundamental subduction processes.	It is important to balance work with direct societal relevance, e.g., on climate change, CCS, or geohazards with 'blue skies', curiosity-driven research. Applied, social impact research is underpinned by such blue skies work, and there's no way to know in advance which curiosity-driven projected will eventually lead to something of societal importance.
Climate response to high CO2 Ice sheet response to warming climate Atlantis Bank lower crust/moho Subduction Seismogenic zone Gas hydrates	Moho at superfast E Pacific

a strength of the program has always been and will continue to be its ability to maintain and pursue a broad portfolio of scientific issues. This approach insures that issues at both a mature state of definition and those at a more primitive state where research is more exploratory can both be addressed. This approach is crucial for long-term scientific advancement.	I think the scientific portfolio is sufficiently broad at this time and would advocate against adding scientific challenges in the absence of re-evaluating the entire portfolio of challenges.
So many... Again from my perspective only, to test to see if some of the previous hypotheses hold worldwide or are they local phenomena. Are Boninites rare or just evidence has been buried? Are the processes proposed for volatile cycling hold up in other locations. What is the influence of the local source on subduction recycling?	Closure of the isthmus of Panama, closure of the Caribbean, anomalous Caribbean crust
Understanding the impact natural hazards have on the global environment.	Increased core recovery in formations with variable hardness.
1. How island arcs form and evolve, and their contribution to continental crust; 2. Dynamics of Plume-Lithosphere interactions, and their relation to continental rifting and flood basalt provinces (requires coordinated ICDP-IODP program). 3. The extent and nature of the deep biosphere in ocean basins.	The dynamics of active plate margins, especially those capable of generating giant EQ and tsunamis.
Developing new tools to be able to drill in different environments, such as hard rock.	
Climate change in a high CO2 world Earthquakes and plate boundary characteristics	
continue to address the challenges in the Scientific Plan	
You had some great ones listed. CO2 sequestration. Sea-level change. Global change has got to be the problem of our time. Sadly.	I am excited about addressing subduction zone initiation.
Drilling in situ moho; understanding the limits of life; seawater-crust interactions.	
Understanding the linkages between the geochemistry, petrology, and biology of marine hydrothermal phenomena of all types (hotspring and coldspring)	Comparisons of plate margin and magmatic dynamics across the western Pacific (IBM vs. Tonga-Kermadec)
	Volcanism and sedimentation in the southwest Pacific.

Earth Conenctions		
	Drilling to the crust-mantle boundary in the Indian Ocean Drilling a long mantle section in an amagmatic spreading terrain such as on the eastern SW Indian Ridge	Nature of the deep biosphere in lower crust and mantle and the potential for carbon sequestration there.
	Drilling at great depths (more than 1.5 km)	
	Actual lithosphere plate tectonic processes to compare with ancient ones.	Deep ocean energetic resources.
	making serious progress towards achieving fundamental, first-order Solid Earth objectives, specifically in drilling the Moho	as per the New Science Plan
	Fluid exchange between ocean crust and ocean	Hydrate stability
	Understanding how new subduction zones form and also how marginal basins form	there are many
	amalgamate findings into to a comprehensive understanding of how the Earth's geochemical cycles are affected/ linked with human-induced climate change and its consequences for the growing world population	understand why and how the Earth's environment changes through time, including those (elusive) links between solid and surface Earth
	Incomplete and biased core recoveries in hard rock. Lack of ability to sample high T borehole fluids	Development of a suite of high T logging and sampling tools.

Earth Conenctions

I think that the JR will be able to make accelerated progress toward solving the initiation of the initiation of subduction through the scheduled up-coming expedition 371 in the Tasman Frontier by providing key constrain on the initiation of Tonga-Kermadec subduction which occurred at the same time (roughly) as the IBM (as I discussed above). By combing results from 371 with IBM drilling (351 and 352) will lead to an important synthesis. New drilling will likely be proposed North of New Zealand to better constrain the conditions of Tonga-Kermadec. The seismic data is now available. Drilling in either the Tonga or the Kermadec inner trench wall is also necessary. But perhaps more importantly, drilling in the nascent Puysegur Trench just South of New Zealand could provided crucial constraints that we can't get from the 351-352 and 371 drilling. Here the subduction zone initiated just 12 million years ago and the key plate kinematic constraints are available and a geological record is waiting to be read. The necessary Seismic data will be acquired in Feb of 2018 by the R/V Marcus Langseth and a proposal submitted in April 2018 so that a new drilling expedition could be scheduled if the JR returns to the Australasia region in 2020. Essentially, by	
1. Cretaceous paleoceanography and relevance to current ocean change. 2. Limits of subseafloor life.	1. Earthquakes, landslides, tsunamis. 2. Microcontinent formation. 3. LIP chronology/environmental impact.
Drilling unexplored domains: very deep crust, very deep sedimentary basins (<2-3 km), drilling submarine delta environments, continue on active thrusting environments	Biosphere-lithosphere interaction: beyond description, what are the critical processes? experience.
nail down climate sensitivity	Funding - keeping the ship at sea. need 12 month operations to clear backlog of good proposals. How knows about the future of NSF, OCE and climate change research.
1. Serpentinization of the mantle: where, and how much; what processes are responsible for hydration/dehydration; link to active surface faulting in diffuse plate boundaries 2. Biological and chemical limits to life within the oceanic plates 3. Subduction initiation	Role of plate tectonics and sedimentation in cycling volatiles out of the atmosphere/hydrosphere and into the mantle

Earth Conenctions		
	In geodynamics: core the earth mantle (mohole!), study the ocean crust geochemical variations related to mantle dynamics	Interactions between water and seafloor, sub-seafloor life
	To get more scientifically pressing questions addressed by drilling. Many of the recent expeditions have been interesting, but not top science warranted by the program.	
	Monitor carbon stocks that may begin releasing to the atmosphere, such as methane hydrates.	How effectively can the seafloor buffer changes in ocean chemistry in response to climate change?
	How to drill deeper to get more deep crustal or mantle samles, fluid and gas in the sediments and lithosphere	
	arc volcanoes and genesis of continent	evolution of back-arc basin
	Oceanic deep crustal composition and dynamics	Intraplate seamount evolution
	Deeper drilling into hard rocks, all the way to the mantle and deep crustal composition of oceanic plateaus..	To gather more information on the impact of post-glacial ice melting and rising sea levels.
	Not in a position to assess	Progress in the "Earth in Motion" science
	As for No. 20.	
	Using the samples that we have drilled.	Using the samples and obtaining data.
	To keep in touch with istututions, to have people from IODP organization to be able to speak with politicians to get money for future expeditions. To invest money in comunications starting from elementary schools and students from different ages, representing the future of research, to explain them critical scientific points of our Planet related to the JR activities and programs.	To promote and integrate innovative studies coupling IODP and ICDP programs, considering in a holistic perspective the future exploration of sedimentary basins.
	Continue working toward a better understanding of hazards (landslides, earthquakes, tsunami; Ch 12); Put significant efforts into subseafloor CO2 storage/flow (Ch 13), which may be increasingly important as an option for mitigating the effects of anthropogenic climate change.	
	Drilling to the crust-mantle boundary and Moho Drilling through the dike-gabbro transition deep into seismic layer 3 in the Pacific	Correlating changes in basement lithology to seismic properties Deep mantle drilling in seafloor exposures

Earth Conenctions	The most critical scientific challenges for the JR in the near term are addressing geohazards and climate change. Monitoring the interrelationship between active processes at subduction zones, using borehole instrumentation, is a means to integrate geophysical, geological, geochemical, and geobiological data to better our understanding of the cause and nature of seismicity and generation of tsunamis in these regions. Too many of the public do not understand or recognize the effects of recent warming of climate and fall prey to those who would suggest today's warming is an expression of natural variability. The work done by paleoclimatologists with cores from the world's oceans would help contribute to better understanding by paired studies of ocean circulation patterns from cores taken from areas considered to be the most active over long time scales and those thought to be most stable over the same scales.	IODP may have to look outside the box. Studies of the limits of life in the sea lead directly into understanding of the potential for life in other parts of the universe. The potential for discovering life outside of our own planet is a huge driver of popular curiosity. It is also a huge driver of science funding under the current US administration. A partnership between NASA and IODP with the objective of developing proposals for drilling in a variety of environments thought to be conducive to microbial communities might be fruitful. The development of instrumentation (NASA is great at instrument development – but will need to improve themselves re pressure-vessels for Europa objectives) that could be used in down-hole or for long-term monitoring of environmental conditions could help to drive funding for both programs. The mandate for PR that NASA has would also serve IODP well.
	What were the causes and how widespread were the effects related to subduction initiation in the Western Pacific at 52 Ma.	The extent of the biosphere beneath the ocean floor
	composition and structure of the ocean crust and volcanic edifices	
	Characterizing an appropriate past climate event to help us better understand our current climate and our future climate.	
Earth in Motion	To core rocks that seemed to be too difficult to obtain technologically.	
	reaching the crust mantle boundary and beyond	
	I am not informed enough to provide an answer.	I am not informed enough to provide an answer.
	- Earth's climate evolution - Ice sheet history - Intersecting the Moho	- Extent of subseafloor life - Changes in biodiversity
	Global monsoon	Submarine geohazards such as submarine landslides, slope stability and recurrence history
	Finally start a Mohole	Mohole !
	the affect changes in ocean water might have,	avoiding political problems
	Long-term ocean crustal evolution and chemical exchanges between solid earth and ocean system	

Earth in Motion		
	In-situ measurements of physical and chemical conditions/parameters across frictional transitions along faults.	The role of serpentinization in tectonics, fluid flow, and rheology.
	Climate change: past, present, and future Hazards to human communities: earthquake processes and potential, tsunami history and generation, ice sheet dynamics and sea level rise threats to coastal communities	Everything else already in the comprehensive Science Plan!
	I believe the IODP needs to consider new areas for exploration, particularly the Arctic.	NA
	Antarctic ice sheet history Greenland ice sheet history Subduction initiation Global ocean circulation history	Source to sink studies of major river to fan systems
	Geohazards and implications for society. Need to engage the base population more and excite them.	Funding for specialized equipment and having a mechanism to test/evaluate/develop specialized equipment especially for downhole operations.
	1) Additional documentation of high-resolution climate change since the LGM. 2) Penetration of the lower crust and uppermost mantle (as a continuation of Expedition 360). 3) Documenting the role of methane in the sub-seafloor biosphere (and potentially as a global resource).	1) Additional documentation of gateway records around the world, to understand changes in thermohaline circulation through time. 2) One or more penetrations of the decollement in (accessible) subduction zone settings.
	Earth in Motion Challenge #12: control of earthquakes, landslides, and tsunamis Climate and Ocean Change Challenge #1: Climate response to high atmospheric CO2	Biosphere Challenges #5 and 6: Origin and extent of subseafloor biosphere, and Limits of Life
	I believe that investigating natural hazards as they relate to coastal communities and infrastucture are the paramount challenges to address.	Sea-level, methane, ocean currents
	(1) How climate, the ocean, and ice sheets will respond to ongoing increases in greenhouse gases. (2) Exploration of deep life within the sub-seafloor (3) Relation between surface, lithospheric, and deep Earth processes (4) To understand the dynamic processes that occur on human time scales, including those leading to and resulting from earth- quakes, landslides, and tsunami	Deep-sea drilling and coring conducted using closed-hole or open-hole mode. Drilling in extreme environments.
	Drilling a conjugate to the transform passive margins in West Africa on the Brazilian side	
	Funding - relevance	

Earth in Motion		
	Initiation and Evolution of subduction zones and the settings/circumstances where hi-magnitude megathrust earthquakes most commonly occur	Not Sure
	Fundamental processes associated with earthquake and tsunami hazards.	
	drill deeper in the crust. Avoid contamination.	better videos and internet to communicate with family and on-shore participants. Enhance public communication.
	drill through the Moho	explore basements of rifted margins
	I would like to see successful climate change results from high latitude expeditions, e.g., in the Antarctic. A synthesis of results from subduction zone fault slip behaviour would be advantageous (successful drilling on the Hikurangi margin, to be integrated and compared with results from eg Sumatra, Costa Rica and Japan Trench and Nankai). Demonstration that CPP expeditions can deliver top notch science as a side benefit of the financial input. A pulling together of recent (and future) deep biosphere results, now that there are multiple expeditions (across IODP) tackling this challenge/theme.	See above
	Borehole instrumentation in subduction zones.	Understanding the seismic cycle.
	Understanding the slip behaviors of faults.	Fluid flow and tectonic history within shallow forearcs.
	Staffing of expeditions with exceptional scientists rather than people on soft money	
	I am involved in writing a proposal to drill on the Brazilian Equatorial margin, to understand the role of fracture zone reactivation in structural and sedimentological processes on a "passive margin".	I think there is great potential in the Mediterranean Sea because there has been so much onshore work done in the areas that surround it.
	- Geohazards (earthquakes, tsunamis, slides) - Climate change, global warming, and sea level rise	-Understanding the role of fluid flow in the generation of geohazards -Knowledge on earth interior (crust and upper mantle)
	Coastal change in the context of a warming climate. Hazards posed by subduction zones.	Developing high temporal resolution records of past rates of climate change, specifically during warming.
	sampling Hikurangi subduction zone and long-term monitoring for slow slip events	

Earth in Motion		
	Demonstrating that the program can undertake large multi-leg drilling projects in a timely and efficient manner.	Deep mantle and lower crust drilling. Particularly getting through the dike-gabbro transition into the lower crust in the Pacific, and to the crust-mantle boundary in the Indian Ocean.
	Not many expeditions have been proposed related to the Earth in Motion Theme, particularly related to geohazards like landslides, earthquakes, and tsunami. The Biosphere Frontier is also still lacking accomplishments. These are challenges that should be addressed next.	
	The science plan has laid things out well and has a good mix of topics.	
	Arctic and Antarctic responses to climate change	
	improving understanding of potentially catastrophic natural hazard processes Potential global sealevel changes associated with polar ice collapse	
	The connection between marine volcanism, hydrothermal alteration and ore formation.	
	Detailed ice sheet and sea-level response to past climate change. Resilience of ocean chemistry and ecosystems to climate change.	Origin of continental crust in subduction systems (abortively addressed on Expedition 350 - Hole U1437E is cased and ready to be deepened.)
	Resolving the processes that control fault slip behavior and earthquake and tsunami generation at subduction zones.	Using borehole (CORK) observatories to contribute to offshore earthquake and tsunami monitoring at subduction zones like Cascadia, where it is not possible to use land-based networks (too far from the trench).
	Integrating data into modelling. Maintaining & improving analytical facilities on the ship	
	Sustaining a stable funding structure--this IS part of science Engaging an ever increasing proportion of geoscientists Continuing to develop new technical abilities to engage cutting edge problems Developing connections with other major science programs (i.e., deep submergence science, OOI, GEOPRISMS, etc.)	

Earth in Motion		
	contributing towards understanding of slow slip events on Hikurangi margin recovering WAIS climate record in the Ross Sea subduction initiation of Tonga - Kermadec system understanding seafloor creep on the Hikurangi margin Understanding processes of water-rock interaction an active submarine volcanoe	
	climate change and deep crustal samples	
	Hazard research	
	The science plan articulates many critical challenges very well. The proposal and scheduling process should continue to make efficient logistical plans to pursue as many of these objectives as possible.	There should be some mechanism to allow some "follow-up" of exciting, and perhaps unexpected, outcomes of the recent and near-future drilling results or other timely geological/geophysical investigations that can be pursued effectively with IODP drilling.
	Again, I am focused on gas hydrates - a multidisciplinary opportunity for the JR to host researchers from geology, geophysics, chemistry, biology and (increasingly) geotechnical engineering backgrounds.	
	Aging structure, including the platform itself and the drilling rig. The JR is now old and showing signs of significant wear, which is beginning to impact its performance, with potential increase in downtime as more repairs will undoubtedly be needed in the future	Funding
	Drill deeper into the basement.	Core recovery and time limit.
	Along with other drilling ships, e.g. Chikyu, motitor the processes, including seismic and fluid flow systems. This pertains to both earthquake activity,and flow of fluids and growth of deep marine life systems that may depsned on fluid flow.	Anything that focuses on changes in climate systems will be critical.
	Climate change	Geohazards and earth in motion
	drill the crust - mantle boundary in several places	
	Mechanical characterization of subduction thrust zones and earthquake prediction	Climate changes recorded in the arctic ocean
	Slow slip and great earthquakes Limits to life and the geobiome Southern ocean/antartic oceographic evolution, circulation and climate impacts over the past 200 million years.	The methane cycle including gas hydrates New frontiers in biogeochemistry

Earth in Motion		
	Tectonic processes involving the generation, deformation, and subduction of ocean floor is largely unknown because of limited sampling and monitoring - JR can and is proposed to fill this knowledge gap, including in expeditions scheduled for 2018.	
	To provide critical science information to allow the drilling program to continue in the next phase (beyond 2023)	
	Understanding of a subduction-zone science	
	Deep biosphere frontier	paleoclimate/paleoceanography
	Constrain seismogenic zone properties and relate these to earthquake hazards and other slip behaviors. Unravel the tectonic evolution of subduction zones, to better constrain the seismic cycle and its influence on subduction margins.	Sample complex passive margin settings, to understand the mechanisms of rifting, mantle exhumation, and associated fault processes and kinematics.
	Drilling deep "in situ" oceanic crust	Drilling fault rocks
	Defining values of input into subduction zones, i.e. sampling oceanic crust/upper mantle ahead of arc systems.	
	Interaction between warming waters and catastrophic events (e.g., landslides); effects on biosphere; role of methane disassociation and seafloor stability.	Improve understanding of stress and pressure changes in shallow depths, related to landslides, hydrates, temperature changes.
	drilling into other subduction zones where the activity is uncertain/disputed and installing downhole monitoring systems (observatory)	I'm not going to mention climate research, there's already so much funding for climate research... let's get back to some solid earth please!

23. Are there improvements or changes that should be made to the JR to help address these scientific challenges?

Biosphere	The length of the expeditions (2 months) is difficult for early career scientist to participate as an off-shore science party member, particularly those with small children at home. Perhaps this can be reevaluated in the future.
	There has long been interest in having a portable Core scanning XRF on board the ship.
	short cores if needed, that is already in works
	YES
	More lab space dedicated to microbiology and more emphasis on contamination controls
	Yes.
	it would be nice to see the MBIO community agree on some common practices/standard sampling, but not sure there are specific things needed on the JR. they are typically receptive to input from communities based on scientific need
	Can the JR be anchored as a way to use it for shallow water drilling in regions with strong currents?
	Develop effect ways to core rock while minimizing contamination.
	There should be more space, equipment and facilities for microbiological and molecular sampling, experiments, and measurements.
	automated PFC tracer analysis on GC
	Yes. The JR100 program should be opened for projects throughout the world as soon as possible.
	I haven't sailed on the JR for almost 8 years, but I would say that standardizing microbial techniques is important for continuing forward.
	All scientists need funding, not just access to samples. There needs to be a better coupling of JR operations and subsequent land-based analyses of samples and data.
	None that I am aware of
	Can JR add riser-based drilling technology, to provide better access to gas-rich or high-pressure targets?
	A more aseptic environment should be provided to be able to work with as Little contamination as possible.
	To what I know: Increase the training / meeting / scientific discussion of the science party before a mission
Climate & Oceans	just leave things alone and get'r done.
	N/A
	Routine LWD
	There is always room for improvements, however the community involved is so large and thriving, and besides all the excellent research that has been produced, there is much more to be discovered. Just continue as it is.

Climate and Oceans
Exploring new drilling technologies that might improve recovery in challenging coring environments (e.g., ice-proximal areas with abundant IRD). There are also newer drilling bits designed for drilling through hard rock more quickly. It would be great to see this technology transferred to coring bits for faster coring/recovery of igneous rock.
recirculating mud system to improve the core recovery
Improving core recovery on glacial continental shelves.
no
better recovery in glacimarine sediments
Deep drilling needs to be faster and with better recovery.
More improved negotiation on permissions of drilling near EEZ. During Exp. 361, we had troubles in getting permission from Mozambique government and lost a lot of times by decision making. Better positioning system during the coring in bad wether.
Improvements to the online and shipboard database and data analysis of the shipboard instruments. With new scientists arriving on the ship every couple months, the computer and instrument systems they need to learn quickly should be bug-free and easy to use.
not sure
Put a multibeam system on board so that we can get better mapping--still around 90% of the oceans have poor quality bathymetry. Plan to do some seismic survey with the ship.
No
Some of the lab equipment in the Core Lab could do with an overhaul (e.g., the Mag Sus track), but other than that I think the JR is in pretty great shape. I believe the microbiologists wanted a few modifications to allow easier collection of low-contamination samples, but this is not my field of expertise.
Changes need only be incremental - JR is already highly capable
Ice strengthening (although probably not realistic).
Drilling technology to recover continuous records of well-lithified (especially silicified or "cherty") sediments would open up new regions of the seafloor and new types of sedimentary records for paleoceanographic study.
Cannot think of any.
I think there should be more "open" workshops that detail the IODP proposal writing process to people who have never sailed, or are not familiar with the process. Many people don't know that they should and ought to be involved with IODP - the science and scientific benefits are amazing!
I am concerned that additions means subtractions when it comes to equipping the JR. For example, many would like XRF scanning available. This would be nice but I am not sure that is is necessary. We recovered some very interesting sediments on my most recent expedition for which, XRF scanning would have been interesting. But it would not have changed the primary cruise results. So what do we subtract for XRF scanning? I am not sure. The JR's most important purpose is to recover high quality core. Everything else is gravy for me.

Climate and Oceans	
	Yes.
	Move to the 21st century. Ask yourself why 50+ IODP staff are in charge and keeping a status quo on almost everything but none of the your young staff are staying.
	Maintain the present-day standard!
	A basic funding budget for participating scientists as a startup may make things more efficient. Currently, many scientists often do not get any funding to work on the promising material that may have collected.
	Riser drilling capabilities in blowup prevention, possibly the addition of another floor for more lab and personal space to allow for larger expeditions.
	My general feeling is that it is an excellent facility. The bespoke software is clunky
	JR should have updated instruments on-board.
	Yes.
	Possibly shorter Legs and the use of special platforms to allow for more flexibility in addressing the science.
	The current JR is well-equipped to carry our these tasks.
	for my research, the ship is an ideal platform
	XRF core scanning onboard the JR
	On stratigraphic complex cruises (like drilling drifts, i.e. high recovery, poor stratigraphic control) take three stratigraphic corrlators along. More manpower is needed on such cruises. Also an Avaatech XRF core scanner on board, with people to run it is needed.
	Analytical facility onboard needs to be tested to allow confidence in the data quality
	To encourage more scientific organization and scientists in the world to participate into the program and submit their proposals.
	On board water sampling continuously during transit and operations for basic oceanographic/geochemical characterization. Make better use of the JR as a "ship of opportunity" as well as for it's specific purpose of deep sea drilling.
	These are improvements, rather additions to existing JR goals
	No
	New drilling technology to better drill/recover glaciomarine sediments
	Upgrade/augment analytical facilities on board the JR (e.g. XRF scanner, stable isotope capabilities in the chem lab)
	Overall, I was impressed by operations on the JR during my Expedition. I don't have any major suggestions for improvement.
	more chemistry equipment available - useful to obtain community input
	The JR is aging rapidly and maintaining basic functionality with strategic maintenance likely will supersede any improvements.
	ship is great, we need to be more cost effective.
	More attention to the identification of sub-orbital, quasi-periodicities in sedimentary profiles should be provided.
	Wider outreach and dissemination of funding information/opportunities always helpful

Climate and Oceans	
	some of the famous core sites for pale oceanographic research are quite heavily sampled and would benefit from repeat or nearby drilling - e.g. ODP 607, 803, 925-929 etc. - shallow ope ocean sites with excellent carbonate preservation
	Sure, some more multidisciplinary work on ecologic response
	Yes, make room for core-looging tools (e.g. the room next the phys prop lab could be used for XRF scanning or tomography
	We need to broaden the shipboard instrumentation, but space limitations hinder addition of new instrumentation. It would be wise to evaluate the existing standard and supplemental measurements, and also the instrumentation used to take them. It may be we can accomplish more science in the same space with some upgrades.
	There can be better assessment of expected weather, sea state, sea ice, and iceberg conditions. Some locations around Antarctica are fine for drilling without icebreaker support (but with good monitoring and advance knowledge of typical conditions). Need for icebreaker support has sometimes been assumed, but without any research into the expected conditions in the drilling area.
	Drilling in areas with ice presents a challenge that can be overcome with flexibility in the choice of drilling sites and perhaps the addition of an ice observing vessel. It would be an improvement to increase recovery of pebbly sediments.
	Improved core orientation capability. CT scanner onboard and made routine with the software developed to make use of the data. A way to fund stratigraphic development as part of the cruise at a level that allows it to really be done.
	None
	wider recognition of the value of downhole logging, both LWD and standard wireline techniques; sailing with a shipboard scientist and/or an IODP tech skilled at using the seismic data that is now part of every sediment-based Expedition as a reference for the shipboard science party in near real time, and integrating it with core and logging data as it is collected
	None
	Non-governmental financial support
	Improved coring recovery and the deployment of state-of-the-art logging tools.
	Perhaps consider allowing more on-board science into the drilling results chapters.
	Look into upgrading technology to allow targeted drilling in variable sea ice environments. Improve technology to cut down on misfires and research methods for getting through sandy intervals.
	Upgrade of the geochemistry and magnetostratigraphic laboratories.
	Not aware of any relevant changes.
	Improving shipboard data archiving would help. At the moment data input is time consuming, manually repetitive.
	Work closely with the industry to learn and apply knowledge accordingly -- for scientific data harvesting and exploring sensitive resource management and usage
	Improvements of the drilling apparatus and operations
	No

Climate and Oceans	
	I don't have any specific idea for improvements at this point. All facilities in JR are great enough for pursuing the science that I am interested in.
	The community has always wanted larger-volume coring systems, but I understand that this is a huge cost factor. The other change that is needed is to provide more funds for pre-drilling survey, and for post-drilling analysis. The paleoclimate programs particularly are labor-intensive and analysis-intensive after expeditions. Often the slowest component is chronology development, so if ways can be found to accelerate that process, it would improve scientific returns.
	MORE & EASIER access to real data, animations to support knowledge acquired, and lessons that align with NGSS, AP, and IB requirements (see HHMI for ideas!)
	Better labs and enhanced capability to produce long (and so deep) record of past climatic archive
	Better computer aided system for stratigraphic correlation and splicing using core section photographs as well as physical property profiles.
	Ability to drill in the Arctic Ocean
	Allowing to take water samples aside sediment samples.
	In my view IODP represents the most important geoscientific program, which ever existed
	Improve fast high resolution core logging capabilities (XRF-scanning, Laser spectroscopy)
	Clearly there needs to be funding to improve and update the systems in place on the JR beyond basic maintenance.
	Try and work with industry for funding and scientific advancement - especially geology and stratigraphy
	to improve the drilling technique.
	improvements of the timing and pre-cruise training support
	Give the JR more 'exploring' capabilities using a small multicoring or piston coring system and basic geophysical remote sensing tools (multibeam bathymetry, side scan sonars, echosounders) and allow more flexibility in the location of drill sites within an already approved region. A small change in strategy in terms of location and drilling depth can dramatically increase the success of an expedition.
	Involve more junior scientists.
	more opportunities for the scientists participated the expedition
	All is fantastic
	yes thanks to core drilling
	need to improve the drilling ability to obtain deeper sediments or rockers below the seafloor
	Biological laboratory on the ship.
	combining drilling with other types of coring
	key priority is to maintain operations funding - the capability, science goals and high quality drilling targets to address these goals are all in place

Earth Conenctions
Include CT scanning as onboard measurements; including XRF scanning as onboard measurements; including diamond drill bits for better recovery of volcanic basement; allowing for drilling below 1.5 km in volcanic basement at increased temperature
The drilling equipment for coring ocean crust, especially young one, needs to be improved
. The possibility to get N-S oriented cores would definitely facilitate the task of structural geologists.
Installation of an XRF scanner that is capable of measuring an entire core section (like the one installed at the Gulf Cost Repository in College Station)
Some more personal workspace for shipboard scientists. SEM equipped with EDS
Yes. There are a few places still can be drill into the deep lithosphere, or the fragments in order to addres the challenges above; e.g., Hess Deep in the Pacific, Atlantis Bank in the Indian Ocean, and some other places in the Atlantic Ocean.
equipment and staff people supporting scinece are gorgous; the challenge is, not to cut the quality of the support
With regards to both challenges identified in 21, I think I would re think the shipboard geochemistry facilities. If the technology permits, the potential of non-destructive shipboard XRF core scanning could be immense in providing rapid data that could provide a more immediate impact of the scientific results. In addition, it would provide a better guide to collection of samples for destructive analyses during the expedition and the immediate post-cruise sampling party.
The JR is now older than the Glomar Challenger when it was retired. It will require funds for refurbishment/upkeep.
be more inter-linked to the deepsea drilling vessel Chyku
Better coring of the upper 1 m of sediments. Narrower kerf APC cutting shoe to reduce coring deformation. More use of nonmagnetic BHAs, coring tools, and core barrels. Better core orientation.
No
I sailed in 2011, so this may have improved since, but at the time, the different sample-tracking and entering systems were not well standardised --- not everything used the scannable labels, and selecting sample numbers from an unordered list was error-prone (and required an IT technician to undo). The petrologists also complained about the database system they used. Simple things, but they wasted quite a bit of scientist time.
the biggest challenge is maintaining technical, operational development on an aging facility, especially as drilling technologies advance. Science would benefit from the ability to conduct ever more different types of experiments in boreholes, and the technical development costs to achieve those capabilities can be large. Whereas operational advancements like drill-in casing has made deeper drilling targets more accessible, the inability to collect good petrophysical logs in many holes (i.e. without LWD) is a limitation.
Modest engineering development is needed along with testing time using the JR.

Earth Conenctions
Probably but I can't say what they would be right now. Getting site survey data seems to be the biggest drag on proposal development.
No. It works fine. More availability (full time)
maximise the core scanning the can be routinely completed
Stronger internet might be needed. You might want to develop a new non-DOS based system for positioning with thrusters.
More hard rock expeditions.
Add an EDS system to the shipboard SEM to permit micro-analysis of unusual materials as they are recovered.
The JR is great! :)
Better fluid sampling in hard rocks.
More international involvement with developing/developed countries.
As above re technologies/pooled experience about ultradeep drilling
no
High-resolution scanning in any form becomes more important as recovery rates in young sediment improve - XRF scanning could possibly be established as mandatory post-cruise feature for expeditions of interest Post-cruise in stead of on-cruise personal sampling could go a long way of streamlining work and in improving science output during and after cruises
Development of a low weight on bit diamond coring system.
Improve recovery of alternating hard (chert) and soft (chalk) layers.
Above all, preserving JR's drilling (drillers) experience is critical. Not really. Any new infrastructure should try to preserve the flexibility of the actual JR, and the experience of the staff.
JR 12 months at sea.
Ability to case deeper? Maybe in that case you need a derrick that can handle a bigger load? I am not sure if that is feasible; and there are also a lot of shallower targets that need to be drilled, for which this would not be needed.
Core descriptions of all types should have higher resolution descriptions in the upper several meters. The available information is invaluable, but cores are often described with only 1 or 2 layers. Other layers are evident in the data, due to density, carbonate, and other properties.
Yes, how to improve the success of logging is very important to the total success.
More expeditions to drill intraplate, mantle-plume derived seamounts.
Hard-rock drilling
Not in a position to assess
Develop tools that can be deployed in much higher temperatures of hydrothermal systems.

Earth Conenctions	Each specialist on board could be a promoter for new ideas and technologies useful for specific goals. It is fundamental to promote during the expedition but also after a collaboration among scientists. I think appropriate to create a net of people attending the different expeditions in a preliminary scientific party before the beginning of each cruise, to find possible ideas of researches and to build up a mood of collaboration before to attend each expedition.
	1,500-m riser system for hard and soft rock drilling
	The JR is an amazing operation. Although doing 21st century science with 1960's drilling technology is a pain and recognizing that no new drilling tech is likely to come over the horizon, concentrating on enlarging the suite of shipboard analytical instruments (a hand-held Raman system?) would be nice.
	Yes. How to recover the sand by coring.
	more drill pipe to allow drilling in deeper water
Earth in Motion	I haven't sailed in a while, but the thermal conductivity probes used for hard rock expeditions really need to be updated/replaced, or the entire system overhauled. We were unable to use the pucks due to failure, and backups were not available.
	Better visualisation of the cores. I strongly recommend X-ray scan / CT scan of the cores immediately after sectioning. That would help determining stratigraphic boundaries, coring disturbances, etc, and greatly help drilling crew to assess how deep to lower the drilling bit. It would also help scientists for unit description and targeted sampling.
	better access to Internet while sailing
	I am not informed enough to provide an answer.
	Nondestructive core imagings and physical propertity profiling
	none I am aware of
	None currently come to mind. The JR would benefit from having a capability for x-ray CT scans of cores prior to splitting.
	Lab-wide assessments on measurement uncertainty and method improvements would help hone shipboard data so that it can be more reliable in future work.
	CT imaging of cores
	Time carved out for training ship staff and testing new equipment.
	To the degree possible, re-powering the vessel to augment DP capability.
	Based on my experience at end of first IODP, the downhole measurements lab may not have sufficient space for observatory-intensive expeditions. The operator was responsive in repurposing other space, but is that always going to be possible?
	It would be a significant improvement if check-shots were a standard practice.
	Working harder to allow deeper penetration and especially improving ability to case holes quickly seems critical
	More partnerships with petroleum companies
	Don't know, have not sailed since 2009

Earth in Motion	
	Continue with the efficient transit/scheduling. Encourage flexibility in expedition lengths, taking advantage of short amounts of time for quick drilling targets, or the need for expeditions >2 months where needed. Ensure there is good communication, planning and development where advanced engineering or specialist tools are needed.
	More reliable under-remer for installing casing. Better method for sealing base of casing.
	More drilling legs scheduled in each year.
	Adequate funding Well run scientific support offices Better on-board analytical facilities including XRF
	No
	-Ability to reach to further depths (e.g. seismogenic zone) to understand the processes occurring there -
	Better hole engineering, and hard-rock bit design.
	I am not a microbiologist so I cannot speak for the potential technical improvements to the JR facilitating the Biosphere Frontiers objectives, but I imagine that there could be changes that would help address the scientific challenges in this specific theme.
	Better contingency systems to anticipate and cope with drilling/logging/analytical system failures.
	Start planning how to drill in the rapidly opening Arctic Ocean
	drilling capabilities
	Perhaps--others would know better.
	The USIO is doing a great job at managing the facility, including taking previsions for upkeep during tie-up periods. We need to start seriously thinking of an approach to generate the funds needed for a JR replacement in 2023
	Increase core recovery, and shorten drilling time.
	Yes, both analytical and down hole systems can be augmented for better results. Current systems are good but can always be improved.
	LWD and systems that would measure and preserve in-situ physical properties can be improved.
	Definitely yes
	Pressure coring, recovering intact microbiological samples. More in situ labs (e.g. fibre optic instrumented)
	Definitely Yes.
	The seafloor resource field should be included.

24. The International Ocean Discovery Program has organized JR expeditions to reduce transit time and increase efficiency of operations. A side benefit of this approach has been the enhanced ability for regional science integration.

	Is this approach beneficial for your research? If so, how?	What are the best forums (for example: workshops, conference sessions) for promoting or achieving regional science integration?	What kinds of scientific products, if any, would you like to see result from this approach?
Biosphere		Workshops probably. If conferences AGU best global conference. (Others such as EGU, Goldschmidt and ICP have too few and too narrow attendees)	papers.
		Workshops or sessions at large conferences such as AGU well before the JR will be in a given region.	
		Workshops and dedicated sessions at conferences with travel funds provided for students.	Scientific papers/ review papers and thought/hypothesis pieces.
	I think this has been a benefit of the new program because it has encouraged proposals to "fill in the blanks" in terms of drilling in areas that have never been explored.	Workshops have proven to be effective in proposal development. Conference sessions are not as effective because there are too many conflicting obligations while at a conference. Workshops forces participants to focus on the task at hand.	White papers and/or short publications would help those not in attendance to learn about the outcomes of the workshop.
	NA	workshops	book publications.
	yes-it's way easier to propose expeditions, addendums, or JR100 legs if you know where the boat is going to be when.	workshops	
	yes. easier to plan and forecast.		
	Yes, since this could allow use of the ship in JR100-type coring legs.	workshops and program planing groups charged with investigating particular science questions/themes.	Ideally there would be a database structure to accept data sets used to support such regional efforts--perhaps through the Site Survey Databank; it would also be useful if workshops were aimed at producing a product--such as a short summary paper in the open literature.
	yes, can plan ahead for site specific	workshops	white papers, EOS, thought papers
		workshops, conference sessions	white papers
	irMS	WROKSHOP	PROCEDINGS
	n/a	workshops	proposed scheduling priorities/integration of projects

Biosphere

Not really, if anything more restrictive	Workshops	technical reports
Yes. Increasing number of opportunity is the most important.	workshop with well-experienced scientists and engineers	Global comparison
not specifically, but it helps for more efficient proposal writing since we know where the ship is headed and can focus proposal pressure there	workshops	white papers from workshops help the community see what people are interested in pursuing in the near future
Sure. It is much better to lose 2 days to transit than 2 weeks.	international workshops with open calls	review papers, new proposals
Allows a concentrated effort in certain geographic areas.	Workshops.	Papers, new proposals.
yes, more studies can be carried out. comparison between nearby sites.	workshop and conference session	
	Workshops and conferences Inviting and integrating scientists from a wide variety of fields and interests and career levels.	
The topics that I address are not regional in focus, but of general significance. So this approach hasn't necessarily helped or hurt my research.	In theory, workshops and conference sessions could both help in this regard.	N/A
This approach has not benefited me directly as I have not said lately (but would like to again soon). I would say that the approach is a huge benefit for costs, regional science integraion, and the world! The less fuel we use the better!	I've seen some great workshops lately, but have not attended. Keep it up!	
N/A	conference sessions	publicly available datasets
Yes, this is beneficial for my research because there is less time wasted and the delicate microbial samples experience less stress which aids in the quality of the samples.	Conferences and outreach catered to broader audiences would aid in promotion of IODP and JR expeditions and the importance of this science.	I would like to see direct questions and methods for combating the challenges listed in the Science Plan.
I think this is beneficial for any research project. The ability to work with several different groups and projects is crucial for the trajectory of scientific progress. This opens up more discussion, collaboration, and future questions.	Conference sessions	
N/A	workshops	co-propose drilling proposals by collaborating scientists

Biosphere	This approach had the effect of introducing greater urgency into drilling proposal plans, since a proposal only makes sense by anticipating the JR track.	I found workshops in nice locations most effective; it also helps to have participants sequestered, for example in semi-remote marine stations without an easy escape.	Drilling proposals, and if that is not possible, perspective papers.
	Yes, more expeditions in one area allow for a much wider range of scientific data from the same area.	Conference sessions	more interdisciplinary papers
Climate and Oceans	No	workshops	Review papers
	Not really, but we can adjust.	regional topical workshops.	white papers since they form the basis for future drilling proposals.
	Somewhat beneficial. Knowing the ship track in advance has been helpful for expedition proponents to plan, and organize themselves.	I think targeted workshops are the best approach for planning regional science, with high impact results presented at major scientific meetings.	Opportunities may arise to split expeditions, or share seismic data
	No significant impact yet.	Real integration requires a workshop, or at least a team ready to write synthesis papers. Conference sessions are good for communication, but I don't thing they're sufficient to achieve integration.	Synthesis papers.
	The efficiency and planning allows for targeted drilling several years ahead of time.		
	No		
	The efficiency of operations is a benefit for anyone involved in the program, and the regional aspect is indeed important, although some regions may have to wait some time until they are reached, but it is the most practicable solution	Workshops (e.g. Magellan Plus)	The scientific products are so many, you likely get lost. But if any, I would really like to see a series managed by IODP where the results are summarized.
		Dedicated conference sessions and meetings	
	Yes- I hope. I'm planning to propose a short drilling objective that can be combined in a regional leg.	Workshops, sessions at AGU, EUG	Tools for integration of regional data- whether software or web sites organized for easy integration.

Definitely - multiple drilling expeditions related to interconnected topics means lots of opportunity for collaboration and better understanding through concurrent research. It is also significantly more efficient and we can get a lot more core for research with less monetary investment. Savings can be put to better use supporting research and development of new technologies.	I think the regional workshops have been hugely beneficial to the development of drilling proposals; would be great to see more integration after expeditions have been executed. For instance, an upcoming workshop to review results from monsoon expeditions (and where to go from there) would be great. Special conference sessions are also incredibly important, but sometimes less effective (especially at really big meetings like EGU/AGU, where they get lost in the crowd)	Integrated books or special volumes to promote the scientific results of these regional expeditions
	Conference sessions	
yes, because the available ship time is used more efficiently	workshops and conference sessions	
Don't know yet.	workshops	NA
yes, because we can address latitudinal transects, for far field connections	workshops and conference sessions, summer schools	
This approach is beneficial to a number of science initiatives and drilling plans because a regional focus will allow more integrated science objectives.	Dedicated workshops on regional science integration with the aim to facilitate a series of drilling proposals for a region.	Papers of more integrated (science disciplines and a regional context) studies.
not beneficial	workshops and conferences apart from personal connections	papers
The target of recent activity in the Indo-Pacific region has benefited my research. It would be in the benefit of all cruises in this region if provisions were made for the wider integration of cruises that are regionally closely linked.	Workshops specific to regional science integration could lead to better attendance.	Aside from each cruise achieving it's own objectives, the integration of these cruises could achieve a better understanding of the onset of monsoonal systems in the Indo-Pacific region
no	workshops	Reports
It helps for long range planning, clearly.	Workshops (Biased, though. I've got a regionally focused workshop.) Conference sessions is another good idea, but those require mature science, rather than planning to do the science.	Legs.
n.a. (not sailed since 2011/2012)	conference sessions in the early post-cruise stage; workshops for integration at a later stage	special volumes in ISI journals; potentially educational/outreach material (e.g. slides summarizing major findings)
	workshops	report
	workshops	depends on the theme
Not directly, but the opportunity to drill extra sites along the ship's track is good.	Workshops and special conference sessions work well, but by their nature they have limited participation. Websites can have broader and larger involvement.	Online publications might be a very good way to link the international community that is IODP participants and to archive their contributions.

Climate and Oceans			
	Not yet, but maybe in the next years, when the vessel will visit the north Atlantic region.	As you suggest, workshops and conference sessions. Eventually "topic groups" (or so) on social media?	
	yes (comparison between sites)	workshop and conference sessions	special issue in a scientific journal
	The latter will significantly improve recovery of sediment cores in the high-latitude ocean.		
	yes - transects by location/depth are important for paleoceanographic research	conference sessions	publications, databases
	Yes, the multiple cruises focused on the various global monsoons will produce complementary results.		
	May be sometimes, but other times may cause long delay in drilling highest ranked proposals	workshops	drilling proposals
	Yes	workshops	
		workshops on specific topics	
	Yes, related expeditions with research coming out at similar times support findings and expand impact of the research	workshops, in my opinion, are preferred	EOS reports would work well and larger integrated research papers
	Yes, but it makes trips to the high latitudes few and far between	workshops	integrated terrestrial to deep ocean transects that we talk a lot about, but that dont happen because ECORD priorities do not seem to be driven by this principle, but rather by media splash.
	Earth system science is fundamentally regional in nature. We cannot understand the fundamental changes that have happened on the earth without comparing how different regions respond. The regional approach benefits both global and regional studies, and avoids the political battles about picking which region is the most 'typical' for study.	both workshops and conference sessions are important.	We need drilling proposals. We need to think of drilling proposals again as ideas, rather than about NSF funding. We need a better way to integrate older drilling proposals and ideas into new thought.
		workshops	
	Better predictability of where the ship will be	workshops	special issues in online journals (avoids problems with the slowest paper holding up others) as we did on Exp 313

Climate and Oceans			
	Yes. It is certainly useful to know where the JR is going to be in 2-3 years time in advance, so we can propose/ support projects that address questions in that geographic area. As I said above, the linking together of the Asian/Australasian monsoon cruises into a linked series of expeditions is a really powerful way of getting an entire part of the climate system nailed down in one fell swoop.	Conference sessions at large events (e.g., AGU, EGU) would certainly help to galvanise interest in regional drilling, but spin-off townhall meetings may also be useful. Further publicizing the upcoming projected JR shiptrack to interested scientific communities may help to spur groups into action.	I'm not sure what you mean by this question.
	This has been such a benefit in the Indian Ocean and will be in the SW Pacific, that we plan to a hold a regional Australasian Workshop in Sydney in 2017, to develop a suite of regional proposals, as we did with the successful Indian Ocean (2011) and SW Pacific (2011) workshops	Regional workshops have proven to be the best method for promoting and achieving regional science integration (e.g. Indian Ocean, SW Pacific Ocean, Antarctic margin). Conference sessions also help.	Workshop overviews on the web and in Scientific Drilling, but mainly excellent drilling proposals within a region, that can lead to a coordinated and efficient campaign.
		Both conferences and workshops.	
	Yes, I think it makes sense, however, it does mean that there haven't been any cruises linked to the time periods I'm interested in (although I see there are some in the system now)	Workshops seem like a great idea, or having a session at an international conference	A workshop summary might be good for those people who couldn't attend.
	Yes it is, because it allows for assessing the spatial variability in cryosphere and paleoclimate variables. It also allows for an integrated public outreach and education effort, which could result in better visibility for the program.	Workshops.	Publications, climate policy documents, public outreach and education materials.
	My research is global so not particularly.	Workshops	
	Very beneficial, for example we now have a lot of complementary work on the Indian monsoon from multiple expeditions. The next few years should yield rapid progress on understanding the monsoon on millennial, orbital, and tectonic timescales.	There were successful AGU sessions this year on the Indian-eastern Pacific region that included many IODP-based studies. Workshops are important to getting the ball rolling on this sort of integration.	Perhaps review papers on regional science topics that highlight the role of ocean drilling.

Climate and Oceans

	Workshops and conference session. Specifically, I think many scientist would benefit from a workshop focused on seismic data interpretation and integration for science proposals.	Proposals for scientific drilling targets
Certainly - in my field of paleoceanography, we are a long, long way from characterizing climate variability in various epochs - so the more holes there are the better - and there is a lot of time that is required to carefully scrutinize the data produced therein; who better than to assess and work up datasets from holes that might be near regions of their own expertise. i.e. scientists working from different countries and regions will have a crucial contribution to cores that are collected proximal to their areas of focus.	I think workshops are the best way to go - they are intimate, productive, and very useful.	Perhaps more instructive videos or media on demystifying the proposal writing process?
yes, it helps with planning my own research.	workshops.	
	Conferences, workshops	synthesis papers
Yes. Can apply to gather many piston cores.	workshops.	
	Webinars and short articles in EOS promoting upcoming transits.	
We will see. As the JR works in waters around Antarctica, it should be important to examine if re-drilling older sites is needed and thus and APL. One example might be to redrill portions of Maud Rise. ODP Site 690 arguably contains the best PETM section, but only drilled 2 holes. Should we redrill if the shiptrack is reasonably close?	Workshops provide the best way to get several of the scientists (young and old) together who have the requisite information so that they can synthesize, strategize, and brainstorm. Seeding the workshop with young and otherwise interested scientists can increase the odds of sparking a new idea. Conference sessions are important to disseminate to a larger audience, which has an advantage that an even more remote idea might germinate. However, the venue makes it harder for the post talk conversation to take place.	
	workshops and conference sessions are both good in different ways	

	Conference sessions in the AGU fall meeting and workshops. Timing is the other important thing (January to early April is hard time to join oversea meeting for Japanese University teachers).	Summary report and/or special publication in free journal.
No at all. Regional science have various and different ways to work and the out come is more political than scientific, with scientists of much lower qualities.		
Regional science does not exist, the effect always will be global.	Workshops and conference sessions; outreach activities.	Special publications in selected open-access journals.
	Conference sessions within specialist conferences - e.g. we are ore organising session on Indian Ocean nannofossils at upcoming reproach conference on nannofossils	Thematic journal issues
Yes, I have been on two expeditions which may be called regional. In the end though, regional changes are often the base for global changes.		
Better planning of location of drilling	Workshops	
Yes.	Both workshops and Conference Sessions.	
	conference sessions have been the most fruitful so far.	
Not in any significant way at this time.	More workshops with financial aid for long distance travel as well as region specific workshops	Integrated approach for future proposal and larger number of stake holders.
Our last expedition was born at a workshop to get more drilling proposals for the Indian Ocean so this kind of active engagement with the scientific community was very fruitful. However, we had to drop a drill site from our original proposal because it was too far away. As I thought the science should be first, this aspect of the approach, or the implementation, was very disappointing for us. We wrote an APL for that site which was scheduled and then dropped for political reasons. So I have mixed feelings about this approach. Certainly the way it was implemented for us was not beneficial.	Both workshops and conference sessions	Drilling

Climate and Oceans

I am concerned that regional or even political (new membership issues) convenience may impact scientific excellence which should be the main criterion; the ship track should always be dynamic so expeditions anywhere have a chance of being scheduled in reasonable time		
Yes! It allowed me to use the expedition 354 time optimally.	Conference Sessions	
Yes. The implementation of Exp. 349 and 367 in the South China Sea has been really interesting to my research.	Not yet recognize.	Scientific publications.
It can be beneficial if these JR expedition are announced with sufficient time so as to be able to have the geophysical surveys in place.	Workshops that bring the international community together are excellent for exchanging ideas and planning science. Conferences are great as well, lecture programs.	Peer reviewed journals, science results entered into databases that are accessible for teaching, post-moratorium data available to the science community for study, a magazine that is published with the non-scientist in mind.
Yes, many have already benefited from this regional approach. It focuses the community and keeps proposals from being stranded in IODP limbo for years on end.	IODP-supported workshops sufficiently in advance (years) of the JR moving into specific regions.	Unsure of questions intent.
yes		
See answer to Q20.	Well advertised one-off focused meetings.	Something simple that communicates what we have achieved to funders and policy makers.
	Workshops, focused on specific regions.	
yes. Stratigraphic control is crucial for all paleoceanographic/climatologic cruises.	National IODP meetings. such as UK-IODP, IODP-NL etc.	greater participation of scientists into the program. greater interdisciplinary research.
	Both workshops and conference sessions	Reports highlighting the outcome
Yes and No, the reduce transit time absolutely enhance the efficiency of JR expeditions, this will make JR only sail in a certain area for those relative drilling in a certain time period. But it is also leave the current expedition with their staff less time to accomplish their scientific report and summarize their result before the next expedition starts. I am concerned that a limited time could affect the quality of the scientific report or results' qualities.	I think workshop is the best forum for people to communicate and learn about JR's regional drilling activities.With working and studying material from IODP, such as cores, data. result which is presented as a course, this will better make the attendant to absorb the importance of the scientific merit of JR activities.	A summary each person's scientific work's results (online file or printed version) from attendant's work after the workshop.

	Workshops are a good forum especially when they have clearly defined goals and planned working groups.	Regional scale publications integrating results of multiple expeditions. In the case of sediment recovery cruises better integrated age models that extend regionally rather than for only one expedition.
Yes.	workshops and conference sessions	Publications
	small targeted workshops	
	School of Rock	
Yes----hopefully will enable multiple cruises in places hard to reach due to limited seasons.	Workshops.	Special volumes valuable from focused workshops.
not at the moment	Workshops	
	If a conference is within the area then this would be the best means, however workshops are particularly beneficial. Social media is also a powerful means of integration.	
yes, I think this is a good thing and has led to some very complementary expeditions.	Workshops	
Yes - it facilitates community-driven workshops to push forward the best scientific ideas and increase proposal pressure to bring the JR to a certain region.	workshops	short reports are sufficient
Yes, but only if two or more expeditions focus on similar problems.	workshops (but only if they are well advertised and open for anyone to attend)	--coordinated workshops and conference sessions --better planning to address similar problems from different angles on separate expeditions
	workshops	proposals to drive the research
n/a	not certain	not certain
Definitely yes. A good recent example stems from Expeditions 353-354-355, allowing to derive regional assessments of for instance long-term monsoon evolution.	workshops	publications in the best journals
Yes - particularly developing research collaborations with scientists in regions where drill cores are being collected from	Small workshops and conference sessions are both necessary. Small workshops with people working directly on a particular site/Expedition are necessary to fully understand and integrate different datasets; conference sessions are important for communicating the scientific results to a wider audience and also to the public.	It would be nice to see data from IODP cruises in a database that is easier to search/find the data that you are looking for. It is currently available but often takes quite a bit of searching to find what you are looking for. Also, some IODP results end up in other databases such as NOAA paleoclimate or Pangaea - it would be nice if these datasets can link with the other shipboard data.
Yes	Targeted workshops and conference sessions or open forum	
Yes, knowing the future ship track allows me to plan research complementary to upcoming science goals and think about proposing new drilling sites.	workshops and major meetings	Most basic is new drill core material that is a long-term resource for research. New drilling in the Gulf of Mexico and off West Africa are most aligned with my current interests

Climate and Oceans			
	absolutely - regional integration in a timely and coordinated fashion will only enhance our bigger picture understanding of climate issues	both workshops and conference sessions	
	This has been a useful approach to me and my colleagues such that we have submitted several proposals to drill in the South Atlantic Ocean based on the projected JR track. Realizing that the ship is expected to be in the South Atlantic within the next several years, concerted efforts have been made to try and capitalize on the opportunities presented by that track. In addition, the development of these ocean drilling proposals has helped drive interest in and submission of ICDP drilling/workshop proposals that would be complimentary to IODP sites in the South Atlantic. This effort is intended to achieve the most science for our dollars.	In my opinion, workshops are the best forums for promoting science integration. They provide the opportunity region-specific collaboration and proposal development and often lead to one (or more) IODP proposals	I think drilling proposals are the best products to come from this approach. Regardless of whether the proposal gets funded, the workshops and proposals are valuable avenues for establishing collaborations and fostering growth and development of research objectives.
	n/a	workshops. NSF-funded leadership events	
	Yes, safe time and increase regional collaboration.	Workshops with a limited number of participants (20 to 50).	
		workshops	
		workshops	
	Much of my work is regional in scope and I am actively drawing on complementary aspects of several legs.	Certainly workshops and conferences, but facilitating frequent use of electronic means between face-to-face meetings may really accelerate collaborations	Interdisciplinary syntheses on regional to global scales
	No --- "full lengths" expeditions are still the most effective		
	Maybe not as inclusive as might be optimal?	webinars, given time/cost constraints on travel	Synergistic resourcing of new calls/bids
	yes. not only does this provide a broader regional history of sedimentation, but it maximizes use of resources. In today's budget environment, the efficient use of resources benefits ALL of us.	conferences conference sessions and/or special paper journal pubs	products that organize, identify and synthesize regional data

Climate and Oceans			
	The efforts put in to Indian monsoon-related cruises have been fantastic and will no doubt yield significant integrated results. While this has been great for scientists interested in the Indian Ocean region, I imagine that others are disappointed the ship has not gone elsewhere.	Workshops and regionally targeted conferences	review or synthesis papers
	Eventually, I think it is - but since multiple expeditions in similar regions also have overlapping moratorium (and expedition results remain within closed group for 1-1,5 yrs), the truly integrative aspects between Expeditions can only be expected 1-2 yr post-moratorium.	workshops: planning and integration of regional science; conference sessions: promoting (and motivation for integrative workshops)	possibly, regional integrative, "review" proceedings - beyond individual expedition proceedings; but requires coordination between multiple co-chiefs and may only be feasible well after moratoria of all involved / applicable expeditions
	Yes, it's an obvious benefit if participation rules are flexible to allow for greater regional participation for countries with smaller membership entitlements (e.g. SW Pacific). Some extra-regional coordination is also worthwhile to address the challenge noted in 21 above.	Workshops	Conference reports in Scientific Drilling or similar
	Sure, at least it can help to faciliate the reasearch	workshops are better	data reports and research workshops
		conference sessions	
	Not for me personally but I think it is a good idea. To evaluate cruise time for drilling and transit, IODP could come up with something better than "drilltext.xls".		
		Workshops or dedicated conferences rather than sessions in larger conferences.	Expedition scientific results volumes remain a good resource and focus completion of initial scientific studies.
	Absolutely. We are just now beginning to realize the potential of this operation. The recent session focused on Indo-Pacific precipitation, and the upcoming workshops integrating those results, will provide for even deeper and broader analysis.	Both workshops and conference sessions are great. I would love to see a wider scale Penrose style conference too	Special volumes linked to workshops.

Climate and Oceans

This has been beneficial because it has allowed focused multi-leg scientific effort on different aspects of particular problems, such as the Asian monsoon, the Izu Bonin margin, etc.	Workshops are great because they assemble a set of interested scientists (of different backgrounds) to focus on one topic. Conferences are good too, but more for science updates than deep planning - there is always the next session to rush off to.	- Integrated science plan for several drilling expeditions around Antarctica and the Southern Ocean. - Community-building. These multi-expedition topics require a good community in order to staff them and squeeze the maximum science from the cores.
n/a	workshops	scientific reports, lay reports
Closer international ties with improved integration of results, supporting higher-impact publications	Targetted workshops (particularly post-expedition)	Scientific products excellent but perhaps closer integration across different themes (not unique to JOIDES by any means but could be a leader in this regard)
Yes, it should provide more opportunities for high latitude drilling.	Both, workshops and conference sessions are beneficial. I think theme sessions are a good way to present new data because they are open to a wider audience than a workshop might be.	It would be ideal to produce a synthesis volume that summarized new knowledge from more than one drilling expedition. I think this would require some time to assemble so it would be a good idea to facilitate its completion by setting aside funding for it. Perhaps it could be the proceedings volume for a meeting that was held some years after the initial scientific papers were published.
As I am mainly a shore-based investigator my work has not been impacted.	Difficult to say in this funding climate. I would be interested in an innovative type of remote conferencing.	
Of course, but need to have integration workshops. In general I believe the post cruise coordination could really be improved and I science meeting is not nearly enough. But to do it right it needs to be supported.	Workshops for achieving, conference session for promoting.	Special issues would be nice.
Yes, from a regional approach, though it does mean that some of the studies in my regions of interest will be postponed or many years away.	Smaller workshops dedicated to these processes. I think conferences are too busy to run good sessions.	Better integration of different fields to address regional issues.
Yes, by focusing on drilling around Antarctica and hopefully Greenland/Arctic	Workshops. I would recommend better integration with GSA (Penrose) or AGU (Chapman) to get a more diverse group of stakeholders to participate	Promotion of results by scientific societies as examples of evidence-based science used for addressing societally relevant science and policy issues

Climate and Oceans

This approach is beneficial because it allows the regional community to coordinate within a predictable cycle of proposals, refinements, and expeditions. The regional expedition model also stimulates the development of APLs for individual high-value sites that may not carry a full expedition.	Workshops are crucial for promoting regional science integration.	One persistent challenge with IODP involvement seems to be that you have to be in the room to be in the loop. Workshops need to support participation from newcomers as well as old hands, and should publish outcomes as a white paper.
it sounds great, but due to the delay in waiting for analyses to be completed and published and the moratorium to expire, fully exploiting a "regional picture" takes many years to become practical; and it clearly shuts out those whose study topics are regionally defined, waiting for the regional plan to swing around to their part of the world	call for regionally themed sessions at national/international science meetings followed by call for a workshop to focus the interests and develop drilling strategies	drilled holes with quickly published results ....
Yes. Allows planning.	Workshops and conference sessions both, as they get different populations. Workshops more important, but the AGU sessions etc are also very important.	Truly synthesis compendiums (not just compilations, but synthesis of THOUGHT) as well as creative drilling proposals.
yes, we could really nail down southern and northern hemisphere individual ice sheet records in the coming cruise tracks	all of the above	great data sets and papers, duh
Could be, but has not been. Seems like a good approach.	Probably conference sessions.	Published papers.
Yes. Many impacts are more local and inform our understanding of global Ocean dynamics	Conference sessions, publications	Publications, videos
It could be, depending on the location. Some of my work incorporates regional changes and if a cruise were to sail to this area, I'd be interested in participating/requesting samples.	Workshops	Better engagement with public
absolutely. It makes planning/proposing easier, and allows for the development of multi-leg transects	workshops.	

Climate and Oceans	Yes very beneficial because these regional datasets are very complimentary to each other and their integration produces robust scientific results that surpasses the weight of a single expedition. Take for examples all the Expeditions in the Indian Ocean where current and climate change data from four legs now provide an extensive data base.	Workshops for planning and conference sessions for post-cruise integration.	A special publication that summarizes the results of the common aspect from several expeditions
	Provides more time within an area; maintains community interest in that area.	Conference sessions for providing initial results; workshops for producing more integrated outcomes of more scientifically mature research	Standard publications are always good, but I would also like to see visualization products of integrated outcomes. These would be helpful for the scientific community, but would also be very useful in education settings and in communicating our science to the public (and funding sources).
	The transits have been used to support USSP-sponsored "School of Rock" educational and outreach opportunities; I've been involved with many of these. I would hope the education and outreach benefits from scientific ocean drilling are also emphasized, and not relegated to minimal coverage.	Workshops and conference sessions have been very successful.	
	not applicable	workshops	
		I attended the recent workshop on Antarctic Drilling and found it was a very valuable experience as an early career researcher for determining how I could be most effective in addressing a regional scientific problem. Additionally, it was very interesting to see and participate in discussions in planning regional science priorities. I would like to see workshops like these continue.	A short publicly available workshop report that summarizes the discussion.
	Yes, and particularly now with the addition of the JR100 plan	Workshops are best way to achieve regional science integration, whereas conference sessions are the best way to promote it	More of the same--fantastic results and interpretations in all of the best journals that are out there. Basically, keep doing what the JR has been doing to absolutely fantastic success. The ROI in terms of science continues to be off-the-charts

Climate and Oceans			
	Yes. So more expedition can be proposed along the way of transit.	Post-cruise meeting is crucial, where the scientists involved on the expedition come together and discuss the upcoming research/ publications.	
	While I understand the need to reduce transit time, I think a majority of the sites that are unknowns on the map take longer to travel to. I think there should be a focus on both short and long transit time expeditions.	I think that workshops are a great way of bringing together experts in a particular field to build a case for why the JR needs to go to their specific location. I think if advertised well there could be involvement from early career scientists to established scientists. Maybe making a goal of having half early career and the other half established field scientists. Additionally, splitting up the number of participants from each working group. Such as so many from USSSP, ECORD, and so on.	Strong international collaborations that will ensure not only success in the program but illustrate the importance of international science the JR promotes.
		Workshops	white papers, rfp
	Yes, I think it will help me find collaborators to improve my research. I'm still in the early stages of working with IODP but I envision this being beneficial.	workshops, conference sessions, meetings on board the JR	review papers of key scientific results, summaries of the key questions that remain about various regions/where we need more data
	Yes, due to the complexity of the monsoon, the drilling of the Bengal and Indus Fans are critical for understanding monsoonal change through time.	Conferences, teleconferences	collaboration among scientists
		Workshops prior and after expedition	Wide collaborations
	improve the possibility for drilling longer and higher-quality cores	workshops	more cooperative papers published in high-quality journals
	N/A	As mentioned: worskhops and conference sessions.	
		Workshop	
	Yes, recent IODP expeditions in the Indian and Pacific Oceans will allow integration of monsoonal climate variability records from different regions and provide a better understanding of phasing between high and low latitude climate change.	workshops and conference sessions	

Climate and Oceans

Always makes sense to be "efficient" and to reduce transit time to save time and money	Workshops, video conferences	
By reducing the time, we could penetrate much deeper to get insight into the basement nature and core more basement rocks.	Conference sessions, academic exchange or visit, collaboration	Papers, projects and presentation.
Sure-regional international cooperators are a big part of what we do. Their participation is made easier by local access to the RV	Small working groups allied along interest areas and small conferences where there is time to interact with all participants.	Exploratory and innovative studies and techniques that expand the researcher's ability to unravel complex climate earth system processes
N/A	workshops	reviews, drilling proposal, community-based collaborations
The benefits of this approach	I think current approaches for the promotion has done great performance, but it may be great to put slight effort toward the public. Their effort is not clearly seen as that to the scientific community.	Publishing a book and making webpage associated to them, as it is currently, are good enough.
NSF could be more pro-active about funding site survey activities well in advance of regional drilling operations. Surveys (including exploratory short cores) are effectively money in the bank for future drilling. I've been on too many expeditions where survey was marginal because of poor funding. Also, beware the tyrany of the regional plan. If the very best science is proposed across the world, we should be able to do it, using transits for other operations such as JR100.	focussed workshops. More post-cruise meetings. One is not enough for everyone to put together their science. I'd rather see funding focussed on strong results, rather than spreading it out so thin that nobody can really accomplish their goals.	I still love the old expedition report volumes from ODP. Old fashioned, perhaps, but the collection of papers gave a firm deadline and held expedition groups together.
	OPTIONS each team is different but financially online at own pace and time zone is most practical	more educational materials of course! :)
Yes, but only marginally and highly variable depending on the quality of the regional scientists involved	Save the money and implement the labs on the JOIDES	Little expectation, but understand the political ramification underneath it.

Climate and Oceans			
	Yes, for regional science integration. But partly No, because the number of scientists who can be engaged in science in the region within a short time is not enough.	Workshop held in the region.	Stratigraphic summary and inter-site correlation covering wide area of the region
	Limited benefit as little new data has so far been released on areas of interest for me	Intermediate to small regional and topical themed conferences and workshops	More international involvement at the single researcher and nation level
	Not really as the JR is not in a critical region now	International workshops with clear target questions	Review paper (open access)
	Yes	Conference sessions. Information through web sites	publications in high rank scientific journals
		The main one are postcruise meetings, and additionally: AGU, EGU and other smaller conferences such as the one that will be held this year in Birmingham prior to the micropalaeontological society spring meeting.	Mainly publications, ideas for proposals, and sometimes outreach.
	It is extremely important to address some of these problems (e.g. Baltic Sea, Arctic Ocean Drilling) through alternate platforms, building on the enormous experience gained through JR expeditions (e.g. by implementing pore water research and deep biosphere aspects following IODP routine).	pre-cruise: workshops post-cruise: sessions at science conferences	high-quality publications extended data base of any shipboard data for use in modeling studies of processes important for global geochemical cycles
	No		
	see previous comment specifically addressing this added benefit of targeting proposals in same area as JR transits to locations where there is proposal pressure	Regional workshops	scientific articles and new drilling proposals to address the new questions that surely will be raised.
	We can use		
	Yes, more ship time available for drilling high-recovery legs and produce reliable complete splices	conference sessions (i.e. AGU, EGU)	regional synthesis volumes
		Workshops and conferences. Try to reach industry folks please.	

Climate and Oceans			
	No. Every expedition has a theme, but sometime no relation between themes.	I think workshops are the best forums for promoting regional science integration.	The scientific products that improve the understanding of regional geology.
		money is too tight. Meetings cost money to attend. Better spent on research.	
		Workshops/meetings, collaboration proposals	
	not so, depend on the situation.	conferences and guest lectures	books and articles
	It's not a problem, and makes the cruises more efficient	Small workshops. Small groups are best at promoting one-on-one interactions and building relationships.	Group plans, like "Here are the scientific questions our sub-community is interested in, here are the data gaps, here's a list of people who will generate that data"
	Yes, as many similar objectives and results can be shared.	Workshops.	
	It makes perfect sense. It makes operations less costly and greatly facilitates international, multidisciplinary collaborations.	I think that workshops are great opportunities for scientists to communicate and start collaborations and to integrate scientific drilling science. Because of their smaller scale compared to larger forums, they are more conducive to deliver products. Also, many people feel more comfortable and are more extroverted when they work in smaller groups.	It would be nice to have more updates on what has been discussed and decided by the different working groups
	very much! a chance to feel the ocean and access to the ocean samples	workshops	new ideas
	Yes, to study and understand the biochemistry and microbiology in the deep sea floor	Workshops	
	yes - more polar expeditions	workshops	
	Yes	workshops, conference sessions	South pacific - investigating past climate change to model for present and future climate change
		workshop	

Climate and Oceans	Yes because for example, to study the ice-sheet ocean interactions on continental shelves, you need to survey different places that are subject to sea ice growth or drift, so saving execution time is a real improvement to the survey. Each minute counts.		Multi-proxy database and synthesis, significance and limits of interpretation of each of them in order to better integrate the data in a global framewokr and in regional and climate models.
	This approach has frustrated my research because it has meant that I have been waiting 7 years for scheduling of a highly-ranked proposal.	Workshops such as the excellent one on "Antarctica's Cenozoic ice and climate history: new science and new challenges of drilling in Antarctic waters" held in College Station last year with USSSP support.	Research papers in intetnational peer-reviewed journals.
		Gsa	
	Yes as it provides focus for potential proposals and participants from my teams to aim for	Workshops and themed sessions in conferences have been very effective, webinars are not really good substitutes for these	
	Yes	Workshops that specifically address regional science integration	- Relevant publications on a major scientific question - Dissemination of these results through conferences and exhibitions for the large public.
	yes by increasing transects, number of sites	both specific workshops and dedicated sessions in national and international conferences	
	Yes, this means that we can have more time spend on drilling, and have the chance to obtain more samples for scientists to do their research	workshops are more efficiency	special issue
		conference sessions	
		conference sessions	
		workshops	agenda's and fundings (regional) or investment from consortia in regional research and integrations/outreach
		magellan+ workshops	
	In early stages, but efforts to integrate regional paleoclimate understandings from the Indo-Pacific region have potential to yield significant added value	Workshops, themed sessions (AGU etc) and potentially, joint post-cruise meetings.	A concerted effort to bridge between paleo-data and modelling communities would be of great benefit

Earth Conenctions

Yes, as it has a tendency to result in regional focused multiple drilling expeditions allowing a more wholesale science approach across multiple expeditions	Small workshops, like detailed planning groups	Synthesis papers in high impact journals; glossy coffee table special volumes once every 5 years, like an oceanography volume
No	Workshops	Published reports
	specific meetings during conferences	publications and reports
It is not.	workshops	
	workshops	journal special issues
not yet for my area		
Yes. The IBM expeditions allow comparisons between components of the system.	Dedicated workshops are the best format for science integration.	Synthesis publications.
	. "Medium-sized" workshops (max 100 participants) with talks by specialists of the area followed by brain storming sessions devoted to identify the "big" questions that can be addressed by drilling in this geographical area.	Conference reports enlightening the state of the art on the regional geology and drafts of drilling pre-proposals.
Yes, enbales APL proposals	I think both but conference sessions (at regional conferences) might be better to attract more local scientists.	
Accessibility of sample material and direct observations from within the oceanic or island arc crust. Adding the third and fourth dimension to marine geology.	Workshops (see annual German IODP meeting)	
Yes, it is very beneficial for our research. Ship-time of drilling is precious. And we can make clear reagional plans in this approach.	I prefer the concerence sessions for promoting the regional science integration because there will be more new participants involved compared to the specific workshops, although workshops are also a good approach to specify the targets of the drilling when it is already mature enough.	Articles on journals; such as Scientific Drilling, EOS, or other academic journals. Brief summary should be distributed as reprints and/or brochures at conference booths, or any occasions.
Not to my research but very beneficial in completing a major effort to understand monsoons	Workshops	
	workshops	White papers

Earth Conenctions

This is necessary in order to save money which is necessary to continue IODP; this should be independet of personal science	workshops, conferences	focussed Expeditions; new research programs;
Note sure	Workshops at large international conferences (e.g. AGU, Goldschmidt) work best for me, so that I can combine the costs and logistics of attending international meetings.	Not sure
It is a logical, beneficial approach. The three 350/351/352 cruises are a perfect example.	Workshops over conference sessions. A focussed workshop inherently has more scope for meaningful scientific discourse than a conference session.	It would be extremely useful is small scale funds ~5000 GBP or less might be available for preliminary data from workshops taking place after post cruise meetings to help nucleate and solidify unexpected and unpredicted collaborations.
Yes, since it provides the possibility that larger research goals, involving wider regional or global areas, may be achieved by multiple, smaller expeditions that require not a full 2-month drilling period.	implementing international workshops to develop the critical mass of scientific questions to compile new IODP proposals and implement transnational joined priority programs at respective research foundations.	Joined priority programs, special issues in scientific journals open workshops
	Workshops	virtual collections of peer-reviewed papers that define the state of understanding of the regional problems (Monsoons, subduction initiation, tsunami-genic or slow-slip earthquakes).
Absolutely Yes. The approached was wonderfully executed 3 IBM expedtions in a row and one (Exp. 366) currently ongoing in the same area.	Workshops and conference sessions. Workshops will be better interaction but more expensive to run.	Review articles of the state of science published in the wide range of journals.
Yes, it helps move the ship to new areas of interest.		
No	Both workshops and conference sessions. Drilling at Atlantis Massif for example (Exp 357) arose from a proposal developed following a Magellan workshop.	Proposals!

Earth Conenctions			
	Unsure. It's also important to make sure certain regions don't become 'orphans' where it's impossible to get an expedition funded and scheduled.	Conference sessions or workshops within major conferences seem best to me for promoting international participation. Smaller standalone workshops are great, but often seem to attract primarily scientists from comparatively nearby. Piggybacking onto something like AGU, EGU, or Goldschmidt seems preferable.	Make it clear on the website how different expeditions link together regionally.
	Yes - more time available for science drilling	Depends on the region and discipline. AGU and EGU conferences are good starting place for many.Specialised workshops are excellent for detailed planning.	
	Yes, I think that multiple expeditions devoted to various aspects of a broad problem within a restricted time window helps foster discussion and interaction between scientific parties. However, the competition that arises between expedition parties via IP protection and the post-cruise data moratorium are hurdles for this kind of collaboration. I think that people are doing reasonably well in this area, but I also think there is room for improvement in managing across expeditions.	I think that this is really people- and issue-dependent. I personally prefer workshops because I like to dig into the details of a problem, but I recognize that conference sessions may work well in other circumstances.	the problem is that the successful result of this kind of integration results in both integration of existing information and a clearer understanding of the paths forward. As such, any report issued at the conclusion of such an event should be ephemeral - valuable in the moment but obsolete in as little as a year later. The effort put into such a report should be commensurate with this realization.
		workshops	papers
	Yes. Targeted drilling/transect drilling to answer one or two specific questions in a short amount of time would be beneficial and enhance longer drilling cruise research.	Workshops. Just participated in a ECRW workshop and it is excellent to have so many folks around one table and to hear from seasoned IODP/NSF panels.	Pre-proposals
	Yes - it allows us to plan better expeditions based upon knowing where the ship is going and when.	Focused workshops rather than conference sessions	Eos articles that inform the community of where the ship will be going and the results from the expeditions completed using this model.
		Workshops	

Earth Conenctions			
	Yes, extremely so. It means a series of related projects will occur in close proximity to one another, in both space and time. This was the impetus for my recent participation in Exps 352 and 366, which look at the yin and yang of early subduction.	IODP or ICDP workshops (better - combined ICDP-IODP), conference sessions, Chapman and Penrose meetings. Special sessions at national meetings also good.	More ICDP-IODP cooperation, a larger role for ECORD, more integration between IODP and the non-marine science community.
	yes		
	Yes and no. It means less wasted ship time. I was co-chief of an expedition that had to spend 20 days in transit, representing a lot of lost operations time. But I am also late in my career and the JR will not make it back to some places before I am done.	Workshops are best	Workshop reports that PIs can use for the foundation of proposals.
	science is best done wherever the optimal target can be identified, in principle; BUT the obvious advantages of the ocean-by-ocean style of deployment are clear in terms of stability in planning, fuel savings, and common multi-leg themes	all of the above	volumes of "published" coherent works...reviews
	Not directly, but I think it is a good thing.	not sure	themed publications
	Absolutely - the linking of several different Expeditions (350-352; 366) allow for integrated investigations of geospatially (and potentially chonologically) related phenomena.	Workshops that lead to synthesis publications can serve regional integration.	Journal special issues, or dedicated volumes (AGU Monograph; GSA Memoir).
	This is beneficial to all the scientific community		
		ANZIC workshops on our region to discuss and promote scientific drilling and develop proposals.	Scientific drilling proposals

Earth Conenctions			
	It would be if they scheduled multi-leg programs together rather than approaching them as more "leg-at-a-time" science that then drags these programs out over many years.	workshops	Reports that emphasize the kinds of science that needs to be done, with only broad regional recommendations, rather than specific drilling proposals - which should be an after product of the workshops for peer review.
	NO	workshops	scientific pubblications
			Social benefits and energetic resources.
	Actually no because up to 25% of expedition time is still being taken up in long, long transits, and which is counted as part of the 60 days of the expedition. Science time is hence significantly reduced. This occurred even when the ship could have put into a nearby port, picked up the science party and started the 60-day clock at that time. Whereas the Operator may save costs this is a counter-productive way of getting science done.	Yes, workshops, conference sessions.	Reports from the scientific community with appropriate recommendations.
		workshops, social networks	
	Yes, provided the plan is published in good time so proposers have time to submit.	Conference sessions	
		webinars would also be good if widely advertised	More outreach activities, or ideas for implementing similar scientific concepts with minor preparation materials and costs.
	not really	more effort explaining to undergraduates and graduate students	books and videos for this audience.
	Not sure what's meant by 'regional science integration'	workshops and conferences	summary/status papers distributed to the community
	Not so much.	Workshops.	Workshop reports, special issues of journals, where appropriate.

Earth Conenctions			
	I think that the future planning of the track of the JR has been incredibly helpful. This helps focus proposal submission and once the drilling is underway and completed it facilitates regional integration of data. But I also think that it helps scientists working on different topics to see if there are synergistic opportunities to drill in the same area. Two good examples are 356 and 371. In the case of 356 (Indonesian Throughflow), the proposal was originally motivated by and aimed at getting continuous coring. But we also expected some profound tectonic changes to be read in the record, the precise climate records has given has some great data to see come preveiously unrecognized patterns of tectonic subsidence. In some sense 371 was also motivated by getting tectonic-orientated and climate-orientated scientists in	Probably both focused science workshops and regional planning workshops are beneficial. The individuals in a defined area need to work closely together to articulate how best to solve the problem with ocean drilling and then to discuss the best location globally. But there is not a lot of synergistic opportunities across disciplines in such meetings. Here the regional workshops, can play a great role, as I detailed above.	
	It could be - increased efficiency and reduced transit times enable more drilling, which benefits all research.	Workshops, stand-alone conferences (eg, Chapman).	Synthesis volumes.
	Yes and no. Focussing the community on one region triggers a wealth of activity and discovery. On the other hand, it makes that you'll have to wait 10-15 year before new expeditions can be planed in the same region.	Workshops are very important. Conference sessions are not very efficient, especially like IODP session in a meeting like EGU.	?? which approach? If you mean this survey, an analysis of the responses should be published on IODP website and in a media like Scientific drilling or broader like Nature geoscience.

Earth Conenctions			
	This is the only sensible approach - the previous approach of bouncing the ship around huge oceans without making sensible science paths was madness. Given sufficient warning allows people to plan great science in specific regions. - although probably 5 years are required to acquire geophysics and other data.	Workshops	Non-binding workshop reports that clearly articulate science drivers and needs. It is then up to champions to lead proposals. This system has worked well in the past.
	Not current research but for future research, I study volcanic ashfall distribution so having offshore cores with tephra layers would be very helpful in generating isomass/isopach maps for a particular region.	Conference sessions, workshops, webinars, social media	
	It's not clear to me if you mean to ask about transit time during expeditions, or transits between port calls when there is not an actual drilling expedition but something else is going on (such as, "School of Rock".) I think using short transits for things like School of Rock is a great idea. For individual drilling expeditions, if the transit time for a cruise is very short, then I don't think this offers us any chance for regional science integration. Maybe we could rent a facility or use a university near the departure port for a few days of meetings of this type, prior to boarding the ship. If there is enough transit time then it would be really valuable to have a "mini-workshop" on board during this transit, to prepare well and practice using all the scientific instrumentation that will be used for all of the new expedition shipboard work.	Small targeted workshops that take place in the region of interest. It is difficult to get all of the cruise participants to go to the same international conference, but this partly depends on which region it is, and how much support the participants can get from their local IODP offices. Also, many of the local scientists should be involved, even if they never sailed with IODP, if they have related observations to contribute.	I am sure there are appropriate ones but it is probably different for each project.

Earth Conenctions			
	Yes, as we could go back to the South China Sea only 3 years after Exp. 349 (although these CPP cruises are exceptional).	Meeting at various scales: special sessions at conferences, workshops	Synthetic papers and new proposals
		AGU, Goldschmidt	
	No. I think this approach has significantly reduced the impact of the scientific output of IODP. Expeditions have been drilled that in the past would never have been considered significant enough.	As stated above, the program hasn't benefited significantly from this approach.	
	Can integrate my science with knowledge from another scientist	workshops or sessions	
			Greater organization of new and existing data, accessible online.
	I think this has helped streamline the proposal process and schedule expeditions more quickly.		
	Yes. The regional format certainly provides a strong impetus for the integration of multiple science communities that may not otherwise occur.	Workshops.	
		Workshops	
		Workshops and conference sessions would be helpful, but webinars and social media would reach a wider audience.	
	Yes	workshops	
		workshops	special issues
		Specialized workshops might be very helpful.	
	No.	conference session, which follows town hall meeting	scientific papers
	N/A	Conference Sessions. Or workshops hosted prior to or directly after major conferences like AGU.	Both proposals and collaborative papers (post expedition).

Earth Conenctions			
	Yes, this is beneficial because of the potential to maximize efforts for collaborative scientific research within each region. This approach also gives a reference for planning future drilling proposals.	Workshops and regional science conference sessions	More integrated approach for drilling proposals
	Yes. Provides guidelines for the necessary pre-drilling activities	Workshops and detailed planning groups	Generic, yet focused science strategies and concrete drilling plans (pre-proposal)
	Yes, as otherwise might be difficult to get the JR down to our part of the world.	Both the above.	
		workshops at international conferenced	Papers
	Sometime during transit people stick together and new ideas start, it's not a priority to be in a rush and a general feeling of competion could be stressful.	Workshop are appropriate to share data and ideas but also conferences are important to comunicate results to a wider community of scientists.	Short presentations in pdf format and posters could be a tool to share information.
	Theoretically, yes it is beneficial to have multiple expeditions in a given region, so that complimentary/overlapping data/results from one expedition can inform the other/s.	Still waiting to experience a truly successful example of regional science synthesis.	
	Yes - though the circuit generates extra proposal that are approved, where they would likely not be in a straight heads up competition, that can lead to less than optimum use of the vessel.	Workshops and conferences.	Workshop reports summarizing scientific interest in a region or a theme. Collaborative international drilling proposals.

Earth Conenctions			
	Yes this approach is beneficial to everyone because it allows for more scientific drilling to be done which means that more data can be collected and more advancements and conclusions can be made. The more time you spend on drilling and recovering sediment the better because if you find something interesting at one site you have time to continue drilling or drill an alternate site nearby in addition to the planned sites. It is also crucial to have regional context when drilling to further understand what is recovered and better constrain the depositional history of an area. Another benefit is that the data from one expedition can be utilized by other science parties in the same vicinity so that the information collected and purpose of the expedition is far reaching.	I think conference sessions are helpful to integrate scientific interpretations of a particular region and start collaborations on similar areas of research. For example, the expedition I sailed on was Exp 367 in the South China Sea and some of the scientists are proposing a session at AGU for all scientists working on the South China Sea to start a discussion. Encouraging collaboration is one thing IODP does really well because scientists must work together to publish data on an expedition and so need to collaborate to get it done. I attended a workshop in College Station, TX to learn how to be a shipboard sedimentologist before I went on an expedition and it was very helpful to meet other students that would be sailing in the future and learn about how scientists work and live on the JR. I also felt very prepared to go and work on the ship as a sedimentologist.	Encouraging more regional science integration will lead to more big picture interpretations and discoveries. It will also help extend the findings from one area to another through chronological correlation and may help clear up different tectonic models and depositional histories over a greater area.
	NA	workshops are terrific.	summary proceedings and annual reviews type publications.
	Yes. More science done, and better coordinated - at both proposal and implementation phases.	workshops	Normal publication mechanisms are fine
	Yes. It permitted a 13-year-in-waiting, highly ranked, and 3-times-scheduled/descheduled drilling Expedition (366) to finally take place. And no, because it made some of the proponents interested in the research for Exp. 366 reach retirement age before the cruise could actually put to sea.	Workshops are the best.	Coordinated drilling proposals, ancillary proposals to funding agencies for site surveys. Young PIs have a hard time developing new drilling proposals because they often cannot acquire funding to support the necessary site surveys and need to work toward attaining tenure or promotion in order to secure their positions at their institutions.
	Yes. It lets us know more about our regional marine and geology science.	Workshops.	More new scientific findings about the earth.

Earth Conenctions

Earth in Motion

Yes, three closely spaced expeditions took place that were mutually beneficial	workshops or focused conferences	integrative papers
	workshops, conference sessions	
	Conference Sessions	
	workshops like the BEM2 are extremely beneficial in allowing stake holders to meet and discuss plans	
I believe it is beneficial for all aspects: 1) efficiency of operations (reduces the carbon footprint of JR) 2) integration of results from nearby expeditions 3) Possibility to meet scientists from previous and next expeditions when I am embarking	School of Rocks	Post-cruise meetings integrating the expeditions that are done in a given region, in contrast to the single-expedition post-cruise meeting that is usually done.
Yes	Workshops	Workshop reports and presentation at the conference such as AGU
No	AGU	-
n/a but it makes huge sense!	I would like more internet forums	communications to the public at large about how the science is helping us understand our world, and how 9-12 education can use the data from the expeditions, if possible.
Not partiticularly. Knowing the planned transits of the JR allows for better development of proposals in a timely manner.	Workshops.	
Mixed bag. I think it's a necessary evil in the current budget climate. But perhaps if it were implemented with more lead time, we would remain able to select the highest-ranked and best proposals within each region, rather than implementing some immature or weaker proposals that are on the table simply because of timing and geography.	Dedicated workshops - e.g., a follow up to the 2011 Denver meeting.	

I have not been impacted by this. The scheduling makes science operation time on each expedition much more efficient. However, it does mean that even if a location becomes urgently interesting--such as shortly after a major earthquake, etc.--the JR may not be able to return to that site for several years.	I don't know.	I don't know.
It could be, but the Arctic has not been considered in the development of the long-term ship schedule.	All of the above.	Regional syntheses would seem to be a real possibility, particularly given that the program is often visiting areas that have been sampled by drilling before.
Yes, more expeditions!	Workshops first, conference sessions second	Special issues in online journals
Yes. It helps people think about where/how their research fits into the global system [e.g.. work that could be done in more than one place but aggregated to have big impact]	Probably workshops.	Small projects that can take advantage of transit locations and times that would never be a "tradiational" leg.
Yes. More days of operation a year for any vessel improves performance for science for everyone.	The new initiative to link scientific ocean drilling to other major scientific programs at the FM of AGU, from 2017-2019, should pay dividends.	Scientific ocean drilling has always been short of synthesis volumes, to document multi-expedition results. Those volumes should be fostered.
Not yet, but I am hopeful depending on scheduling decisions made at next JRFB.	I think regional synthesis workshops are probably better than conference sessions in terms of producing written science integration that could be useful in supporting renewal.	As alluded to in 24b, written summaries that will be useful in the renewal effort.
Yes, as it provides the opportunity to address a specific site while not requiring a full expedition.	Conference sessions followed by workshops.	Data over a broader geographic range.
This will help in having ample time for drilling to deeper depths with successful recovery. And also will help to opt for multiple locations to have better data constraints.	Workshops	High quality data sets and results. The problems to be published in scientific journals.

Yes, integration of different data across a limited geographic area results in a more robust regional synthesis which is critical to big topics like examination of the Asian monsoon system.	Dedicated workshops are better than conference sessions	Special issues of journals
yes - sedimentology connection.	Asilomar-type conferences	Regional published volumes
Yes--principally in long-term planning	I have used both to bring about multidisciplinary coordination and planning and to most effectively return to the science optimizing planning provided by DSDP/IPOD regional panels.	not sure
	workshops	Special issue journal reports / dedicated sessions at meetings.
	AGU, goldschmidt conferences	
	workshops	special issues of journals
Yes, it has made more drilling expeditions possible which enabled science of interest to me to take place. It also should lead to integration of related science from a number of expeditions, e.g., the series of expeditions drilling the Indian Ocean and Western Pacific sediment record of regional climate and tectonics.	Workshops before and after expeditions. Special sessions at conferences. Assistance from IODP in linking all the appropriate groups together would be helpful.	There could be very strong synthesis papers (across multiple expeditions). I think 1 or 2 of these would have more impact than a special/themed volume. A Scientific Drilling article on the topic above (24a) should be encouraged. Plus a press release.
Could be useful to visit several subduction zones in the Eastern Pacific	Conference sessions	Special journal issues, outreach products.
	Workshops, Penrose meetings.	White papers of interest
It has not yet, but it may soon. The NZ margin will have numerous regional studies for integration with JR drilling results. I anticipate these will help place drilling results in a better established regional context.	Workshops are an effective way to bring interested parties together and integrate results. Often workshops bring together research for the purpose of planning a drilling project. The strategy for regional science integration may depend on whether it is before drilling or after.	Special volumes in journals would be the best way to have these results published and collected in a volume that would have the various results all together and easily accessible. Published results in peer reviewed papers would be the best.
Not yet	Multi-day workshops for planning, and post-expedition integration of results	

Earth in Motion

Yes. The three IBM expeditions in 2014 were very complementary.	I am proposing a workshop to synthesize results from four IBM expeditions. We have organized AGU sessions which are useful but there is not enough time for group discussions.	A special issue of G cubed, and identification of problems that can be solved by future research (whether by drilling or other means).
Yes, introducing regional science is a very interesting approach, in a way that allow to "solve" key questions from specific areas, which may also have worldwide impact.	Conference sessions may be OK, but the best forum is a dedicated IODP workshop addressed to a specific scientific topic.	- More information on IODP workshops - Easier access to sail in IODP vessels to solve regional, but important issues
Not to date. I am in favor of using the JR for short-duration, small scale, focused operations such as gravity coring at targets of opportunity.	Workshops, conference sessions and town halls.	
Not yet	International workshops	
Not always. The planning structure has not done this as well as it should, specifically treating multi-leg projects as leg-at-a-time science, which precludes accomplishing major objectives in a timely and efficient manor.	Workshops - not AGU	Workshop reports and improved and new scientific proposals and collaborations, particularly international. Also efforts to plan and coordinate site surveys and share data for drilling.

Earth in Motion

Yes. Knowing the ship's track in advance allows for better planning and submission of MDPs and APLs to take advantage of the ship already being in the geographic area and increased collaboration between teams with related scientific projects. It also puts more pressure on the proponents to move more quickly through the system in order for the expedition to be drilled when the ship is in the proposed area. I am forming more collaborations now with people with related scientific interests in a particular geographic area to write a drilling proposal together in the near future.	IODP workshops and 2nd post cruise meetings, AGU sessions in Ocean Sciences, Tectonophysics, Natural Hazards, etc. GSA sessions in Sedimentary Geology, Geology & Society, Marine/Coastal Geology, Paleoceanography/paleoclimatology, etc. GeoPRISMS workshops,	
Indirect effects of it being more predictable.	Conference sessions work well. Workshops often have a high cost/traveltime to results ratio.	
	conference sessions	
n/a to my research	workshops	
Overall I think it has been good to have 3 expeditions to the IBM area. However, there has not been much collaboration between the three expeditions in the research phase.	The post-eexpedition meeting was excellent. Also I found goldschmidt in 2017 ideal. I hear good things about IBM sessions from AGU, but have not been able to attend due to lack of funding.	More research integration or joint publications across the IBM expeditions. But maybe that will come in the future. i.e. how does the mud compare? what does that tell us about ocean circulation patterns, what about across arc variations in volcanism and fluid cycling?
Not obviously. There is another side to this - the amount of down-time when the JR is now sitting at dock. This is presumably a funding rather than an operational constraint.	Workshops; conference sessions are more likely to be a forum for reporting results (useful as this is) rather than promoting integration.	Not sure of the question - are you asking about outputs from planning, or outputs of research? Planning output needs to be high-circulation, high-visibility electronic/print brochures. Outputs from research need regionally dedicated special issue of high-prestige journals.
Yes. It gets the scientific community in particular areas focused on the various science problems that can be addressed with drilling.	Workshops	

Yes because a series of expeditions are conducted in an area before the ship moves to the next general location.	yes workshops and conference sessions at the national and international level	
	Linked wirkshops and conference sessions are most useful	
	all of those listed. Plus online information.	
Yes. Being able to harness resources (political and financial) around a portfolio of proposals	Dedicated workshops	Success stories that emphasize impact of the results.
	conference sessions	special publications
	Specific workshops and/or conference sessions at AGU and EGU	
Yes--giving a timeline for proposals helps to focus questions	Workshops	Reports, white papers, review manuscripts, special journal issues, integrated scientific analysis proposals
This approach seems beneficial for everyone's research!	AGU	
This approach is highly beneficial. Drilling is usually much more effective if guided by highest quality geological and geophysical data and analysis. However, drilling is required to validate and understand these results as well. A planned approach to drilling locations may allow more efficiently scheduled pre-expedition/post expedition complimentary investigations, which will benefit the entire scientific effort. Scheduling can also allow global collaborators to "work-ahead" of the JR to share the cost and effort of these drilling-related investigations.	In the past the Margins program was an excellent venue for international meetings presenting associated geological, geophysical, and drilling investigation results. This capacity has been reduced in the GEOPRISMS program due to funding priorities, however a return to international, focus area, or focused-topic, meetings could be beneficial. Alternatively, annual AGU meetings still work well within the framework of special sessions, etc.	As noted above, this approach can lead to efficiencies in drilling and in the associated investigations. Such efficiencies may allow more science to get funded and better international, interdisciplinary work to get done. Generally more science and more participants working on common problems will lead to better solutions. The products I would like to see should be broadly achieved through time-tested consensus. This would result from , better data, better analysis, and improved collaboration.

I see this approach as integral to the optimization of extremely expensive ship time. When it works, it's lovely. When you want something done in a location and the JR won't be there for a decade, that can be a bit of a drag.		
Absolutely. This approach results in concerted efforts to address various themes from the Initial Plan in a given location, and the linkages that result from such abundance on concentrated data in one region has proven to be much more valuable than the sum of its parts	Workshops specifically focused on integrating results. Maybe something that tin the future should be asked of the co-chiefs before they accept the invitation to sail in that capacity. i.e. an understanding that the synthesis responsibilities should now be channeled via workshops, and the need for their leadership in making these workshops sucessful	High visibility special issues in highly ranked volumes, with a summary of the most significant achievements complemented with an emphasis in the linkages and correlative advances
Yes, that will give more time to drill.	Open access.	Open access database and other resources.
There is much to learn everywhere beneath the sea. While it would be ideal to work on the best examples of a problem worldwide, the transit time is too much.	Workshops identify big problems. Small groups of highly skilled experts focus on accomplishment of the program	Documentation of realtime processes both in sediment/rock deformation but also identification of links to fluid flow systems. The IODP volumes are very useful.
	AGU and EGU IODP sessions	I would expect integration and correlation of scientific research results of expeditions (for expample last expeditions in the Pacific in subduction zones and rifting regions) which would help to see the big picture.
yes because there is less time lost and it stimulates relevant drilling proposals	workshops are better than conference sessions because participants are far more committed, involved and focused	Perhaps proposal development workshops?
I support this change in scheduling philosophy regardless of whether it directly benefits my research.	workshops.	
Yes	Workshops	Sharing scientific achievements and stimulating each other

Yes- it optimises the ship time available to the community. May lose one year, but gain in another year.	Regional workshops, and sessions at big conferences like AGU	Well curated database, well curated and preserved samples. Maybe think about enhanced core scanning using multispectral/xray CT, x-ray fluorescence for hard rocks...
Not to date, but new to the programme. I can see benefits in better integrating research within a region, and have seen this even at the proposal stage when proposal writing workshops brings together scientists from typically separate disciplines with a range of local knowledge.	Workshops are ideal for small, concentrated efforts to integrate regional science.	Maybe more likely to generate future collaboration than specific products, although regional reviews of questions, hypotheses, and potential projects could be useful to encourage links and new proposals.
Yes, our research focuses on regional geological integration and synthesis.	Large international conferences will bring in more scientists than focused workshops.	Integrated databases. Regional syntheses (documents)
	workshops	
Yes. Plate boundary material retrieved from drilling is so important to understand the subduction zone.	Many workshops and international conference sessions.	Outstanding paper which is innovated from the above workshops and conference sessions.
I do not know exactly.	Workshop	I do not know exactly.
Yes, absolutely. It has enhanced the likelihood of scheduling expeditions, and gives proponents a heads up about when best to invest their time in proposing new research ideas. I has also provided new data sets from previously undersampled locations.	Workshops, sessions at AGU and EGU, topical issues in journals, speaker tours, etc.	Samples for analyses of lithology, mechanical properties, structural evolution, etc. Structural data and core-scale (or well-log) observations. Fluid pressure measurements, and long-term monitoring.
	workshops, outreach activities	
		Core testing, strength/properties database well written journal papers focused conferences
	workshops are great	how about a good old fashioned book (of proceedings)

26. Thank you for completing the survey. For demographic purposes only, we would like to know your institution if you are willing to provide it. You may include your name as well if you wish. This information is optional.

Answered: 464 Skipped: 412

Answers are for U.S. respondents only.

Responses	
UT Austin	18
Oregon State U	16
Texas A&M	15
LDEO	13
WHOI	9
Rutgers U	7
UC San Diego (Scripps)	7
UC Santa Cruz	7
U of Southern California	7
California Institute of Technology	6
USGS	5
East Carolina U	4
Louisiana State U	4
U of Alaska	4
U of Florida	4
Ohio State U	3
Penn State	3
Purdue U	3
Southern Illinois U	3
Texas A&M, Corpus Cristi	3
U of California Davis	3
U of Houston	3
U of Mass	3
U of Nebraska	3
U of Rhode Island	3
U of South Carolina	3
U of South Florida	3
Brown U	2
Foreign affiliation	2
Florida State U	2
Indiana University Purdue	2

Responses continued on next page

Queens College CUNY	2
Rice U	2
Smithsonian Institution	2
U of Delaware	2
U of Georgia	2
U of Hawaii	2
U of North Carolina	2
U of Notre Dame	2
U of Texas Arlington	2
Virginia Tech U	2
Western Washington U	2
Yale U	2
Adelphi U	1
Appalachian State U	1
Bigelow Labs	1
Boston U	1
Cal State U Fresno	1
Cal State U Sacramento	1
Indiana University Pennsylvania	1
Industry	1
Michigan Tech U	1
Montana State U	1
Moss Landing Labs	1
Northern Illinois U	1
South Dakota School of Mines and Tech	1
Colorado University, Boulder	1
Duke U	1
Harvard U	1
Kansas State U	1
Massachusetts Institute of Tech	1
Montclair State U	1
New Mexico Tech	1
Oklahoma State U	1
Princeton U	1
Rensselaer Polytechnic Institute	1
Syracuse U	1
Texas State Aquarium	1
U of California, LA	1
U of Cincinnati	1

Responses continued on next page

U of Colorado	1
U of Iowa	1
U of Maryland	1
U of Miami	1
U of Michigan	1
U of New Mexico	1
U of Rochester	1
U of Southern Mississippi	1
U of Texas Dallas	1
U of Wisconsin-Madison	1
U of Wyoming	1
Utah State U	1
Western Michigan U	1
Western Virginia U	1