Survey on
Building U.S. Strategies
for 2013-2023 Scientific Ocean Drilling

December 1, 2011

to

January 31, 2012

Steering Committee Chairs:
Anthony Koppers, Oregon State University
Elizabeth Screaton, University of Florida

Steering Committee:
Donna Blackman, University of California, San Diego
Gabe Filippelli, Indiana University-Purdue University, Indianapolis
Andy Fisher, University of California, Santa Cruz
Susan Humphris, Woods Hole Oceanographic Institution
David C. Smith, University of Rhode Island
Debbie Thomas, Texas A&M University

Table of Contents

Section I: Introduction

The U.S. scientific ocean drilling community has driven innovative research since the beginning of the Deep Sea Drilling Project. That commitment continues today as we plan for the International Ocean Discovery Program, which would begin in 2013. The goals of the *Building U.S. Strategies for 2013-2023 Scientific Ocean Drilling* survey were to define the U.S. community's breadth and needs for future resources, assess new developments since the INVEST Conference, and provide input for developing the *Building U.S. Strategies* workshop in Denver, Colorado. This report discusses the survey results; the workshop results are found in the *Building U.S. Strategies Workshop Report*.

The Building U.S. Strategies Steering Committee developed the survey for the U.S. scientific drilling community. It was administered through the U.S. Science Support Program and hosted online by SurveyMonkey. The survey was open to responses from December 1, 2011 to January 31, 2012. All scientists with an interest in ocean drilling – whether through participation in expeditions, use of samples and data, or interest in scientific results – were encouraged to participate.

Advertising was conducted through flyers distributed at the American Geophysical Union 2011 Fall Meeting, print ads in *Eos*, and electronic ads on listservs hosted by organizations, programs, and initiatives (e.g., Ocean Leadership, C-DEBI, GeoPRISMS). To achieve participation from all scientific disciplines, career stages, and levels of prior involvement in scientific ocean drilling (including those new to the program), steering committee members also reached out to many formal and informal research networks.

Ocean Leadership received 521 survey submissions by January 31, 2012, including, forty-one from individuals at non-U.S. institutions, four without a valid name and institution, and forty-two from individuals who took the survey more than once. For the duplicate surveys, we used the last survey submitted by the respondent, resulting in 433 valid responses.

Section II: Survey Questions

The survey consisted of three sections: Contact and Background Information, Implementation Questions, and Meeting Application and Nomination.

The *Contact and Background Information* section asked for the participant's name, institution, and email address; how they receive news and information; and general information about their background and scientific interests. Career experience levels were defined as student, less than ten years since student (i.e., early career), and more than ten years since student. Participants were asked about their prior involvement with scientific ocean drilling, academic discipline, geographic interest, and other research initiatives or community groups in which they participate. The participants were also asked with which of the science themes in the *2013-2023 Science Plan* they most strongly identify.

The *Implementation Questions* focused on new science developments and information to help quantify the level of interest in the challenges described in the *2013-2023 Science Plan*. Participants were asked:

- What is the most significant new development in your field in the last two years (since the INVEST Conference, where development of the *2013-2023 Science Plan* began)? Is this new development associated with one or more new drilling-related technologies?
- Which of the following proposals or products (drilling proposal, workshop proposal, site survey proposal, synthesis study on legacy samples or data, outreach products) are you interested in developing during the new program? On what topic?
- What factors create the greatest impediments (funding, laboratory equipment, site survey data, proposal review process, expedition scheduling time, unfamiliarity with system, other) to developing new drilling proposals?
- What is the most important science that each platform (*Chikyu*, *JOIDES Resolution*, mission specific platforms) can accomplish in the next five years?

The participants were then asked to consider each of the *2013-2023 Science Plan* challenges and state whether they are (a) interested in proposing a drilling expedition related to each challenge, (b) interested in proposing a planning workshop related to each challenge (c) interested in sailing (or having a student sail) on an expedition related to each challenge, (d) interested in requesting data or samples from an expedition related to each challenge, or (e) likely to use results from an expedition related to each challenge. A second set of questions asked which of the challenges the participants find (a) most scientifically interesting, (b) most likely to transform the geosciences, and (c) most societally relevant.

The *Meeting Application and Nomination* section served as the application to the *Building U.S. Strategies* workshop. It also asked the survey participant to nominate colleagues and who would best represent the U.S. community's interests at the workshop.

Section III: Demographics of Respondents

A. Career Level and Institutions

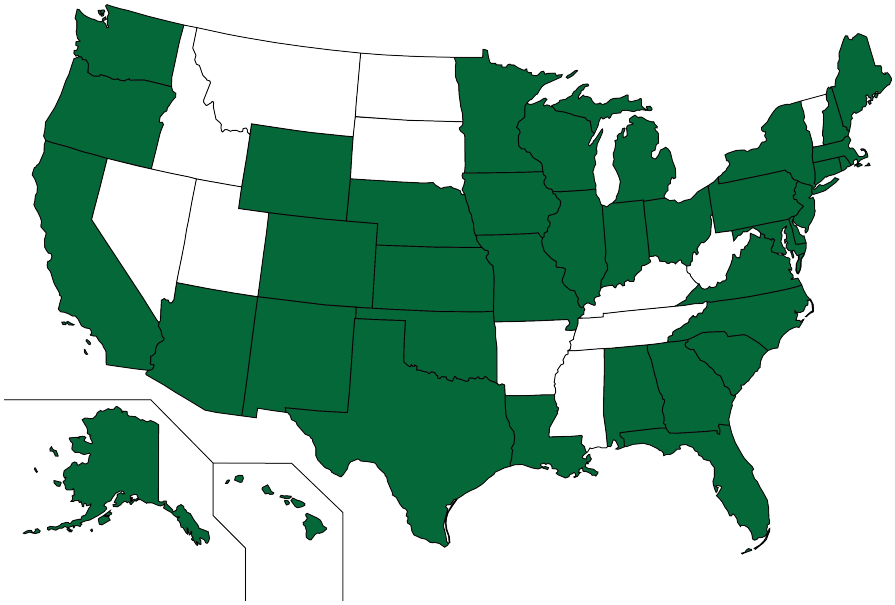
The 433 participants represented 117 institutions, businesses, and government agencies (Table 1) located in thirty-nine states (Figure 1) and the District of Columbia. With regards to career level, 19% of the respondents were students, 25% were early career (less than ten years since student), and 56% were at a mid-career or more senior (more than ten years since student). The respondents had a range of prior experience with scientific ocean drilling: 34% had served on an advisory or proposal evaluation panel, 49% had sailed on a DSDP/ODP/IODP expedition, 31% had proposed a scientific drilling expedition, and 19% considered themselves new to the program. Of those that were new to the program: 49% were students, 25% were early career, and 26% were mid-career or more senior.

Table 1: List of institutions and number of survey participants.

Adelphi University (1)
Arizona State University (2)
Auburn University (1)
Bigelow Laboratory for Ocean Sciences (2)
Boston University (7)
Brown University (5)
California Institute of Technology (3)
California State University, Fresno (1)
California State University, Long Beach (1)
California State University, Northridge (1)
Carnegie Institution of Washington (1)
Chevron (2)
Colgate University (1)
Colorado School of Mines (1)
Columbia University, LDEO (34)
Cornell University (1)
Dickinson College (1)
East Carolina University (1)
Eastern Illinois University (1)
ExxonMobil (2)
Florida International University (1)
Florida State University (2)
Hamilton College (1)
Hofstra University (1)
Indiana State University (1)
Indiana University (1)
Indiana University of Pennsylvania (3)
Indiana University-Purdue University Indianapolis (2)
IRIS Data Management Center (1)
James Madison University (1)
Kell High School (1)
Kent State University (2)
Legg Geophysical (1)
Los Alamos National Laboratory (1)
Louisiana State University (2)
Marine Biological Laboratory (1)
Massachusetts Institute of Technology (3)
Minnesota State University, Mankato (1)
Mississippi State University (1)
Montclair State University (1)
Monterey Bay Aquarium Research Institute (3)
Moss Landing Marine Laboratories (2)
Muskegon Community College (1)
NASA (2)
Neptune and Company (1)
NOAA (2)
Northern Illinois University (1)
Northwestern University (3)
Ohio State University (3)
Oklahoma State University (1)
Old Dominion University (1)
Oregon State University (16)
Pennsylvania State University (6)
Purdue University (2)
Queens College, CUNY (2)
Rensselaer Polytechnic Institute (1)
Rice University (11)
Rockefeller University (1)
Rutgers University (8)
Sandia National Laboratories (1)
Santa Monica College (1)
Shell (1)
Smithsonian Institution (2)
Southern Illinois University (3)
Southern Methodist University (1)
Stanford University (7)
Stony Brook University (1)
Syracuse University (1)
Texas A&M University (18)
Towson University (1)
U.S. Arctic Research Commission (1)
U.S. Geological Survey (12)
University of Alabama (1)
University of Alaska Fairbanks (6)
University of California, Davis (5)
University of California, Riverside (2)
University of California, San Diego (18)
University of California, Santa Barbara (4)
University of California, Santa Cruz (16)
University of Colorado at Boulder (2)
University of Connecticut (1)
University of Delaware (3)
University of Florida (9)
University of Georgia (1)
University of Hawaii at Manoa (12)

University of Houston (4)
University of Illinois at Chicago (1)
University of Iowa (2)
University of Kansas (1)
University of Massachusetts-Amherst (4)
University of Miami (6)
University of Michigan (13)
University of Minnesota (5)
University of Missouri (1)
University of Nebraska-Lincoln (7)
University of New Hampshire (3)
University of North Carolina at Chapel Hill (1)
University of Notre Dame (1)
University of Oregon (1)
University of Rhode Island (13)
University of Rochester (1)
University of South Carolina (1)
University of South Florida (4)
University of Southern California (5)
University of Texas at Austin (27)
University of Texas at Dallas (1)
University of Tulsa (2)
University of Washington (3)
University of Wisconsin-Madison (4)
University of Wyoming (2)
Virginia Tech (4)
Wesleyan University (1)
Western Michigan University (1)
Western Washington University (4)
Williams College (1)
Woods Hole Oceanographic Institution (13)
Yale University (2)

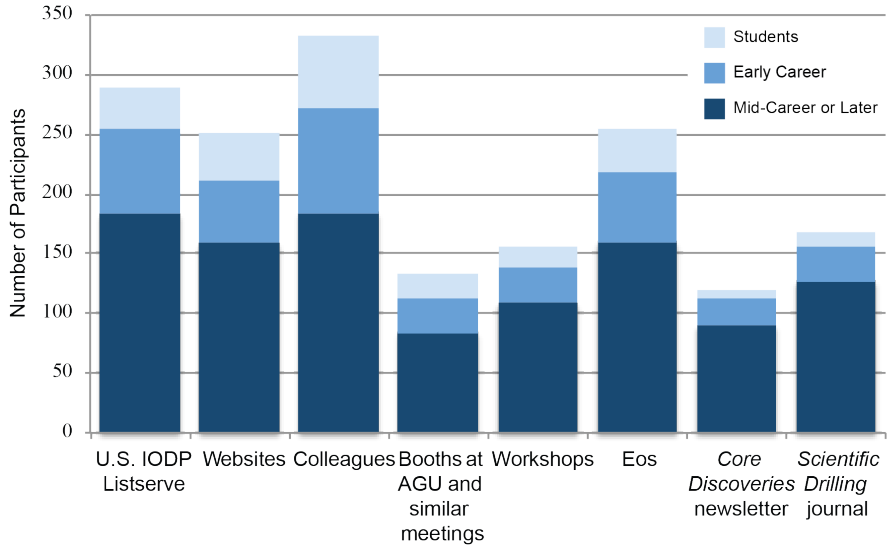
Figure 1: Map illustrating the thirty-nine states that participated in the survey.



B. Communications

The survey asked the participants how they receive information about IODP (Figure 2). Of the choices provided (i.e., U.S. IODP listserv, websites, colleagues, booths at AGU and similar meetings, workshops, Eos, *Core Discoveries* newsletter, *Scientific Drilling* journal), 77% of the respondents selected colleagues and 67% selected the U.S. IODP listserv. Only 31% of respondents receive information from exhibit booths at professional meetings, though such booths also serve scientists and reporters who are not familiar with IODP. The new *Core Discoveries* newsletter is currently informing only 28% of the participants, but the distribution list is growing significantly with each issue.

Figure 2: Histogram showing disciplines selected by the survey participants.



C. Discipline

Survey participants were asked to identify with one or more of the following disciplines: inorganic geochemistry, organic geochemistry, hydrogeology, biology, microbiology, micropaleontology, geophysics, borehole logging, lithostratigraphy, sedimentatoloy, seismology, structural geology, igneous petrology, metamorphic petrology, and paleomagentism (Figure 3). Participants could select more than one discipline and could also select the option "other", to which most added a more detailed subdiscipline (e.g., $^{40}Ar/^{39}Ar$ geochronology) or a research interest that draws upon the disciplines selected (e.g., paleoceanography).

The survey shows that each discipline represents individuals at different career stages, with different backgrounds in scientific ocean drilling, and with different research interests. For example, early career scientists make up 15% of those that selected igneous petrology, 33% of hydrogeology, and 44% of organic geochemistry. Only 29% of the seismologists have sailed on a drilling expedition, while 70% of the hydrogeologists have done so (Figure 4).

Figure 3: Histogram showing disciplines selected by the survey participants.

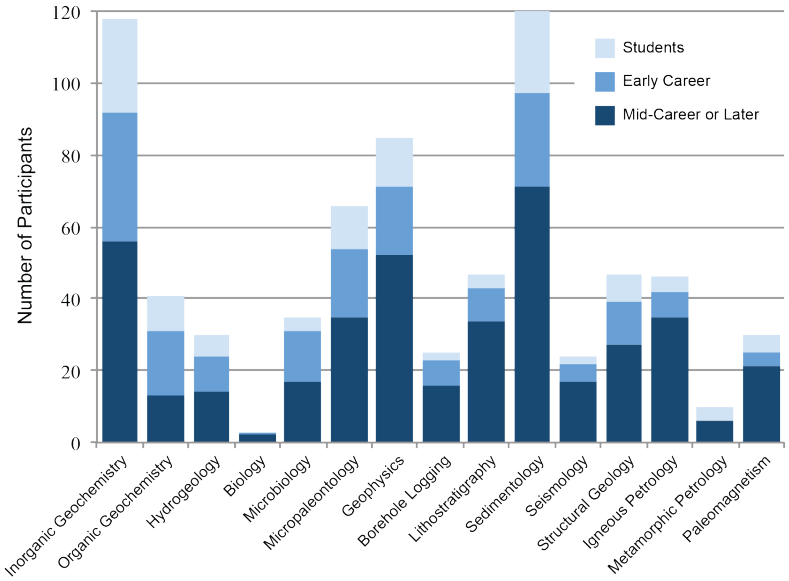
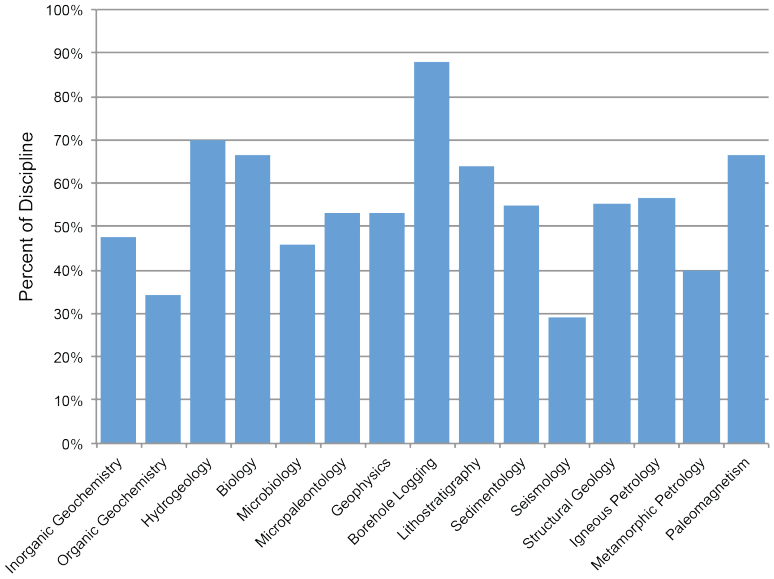


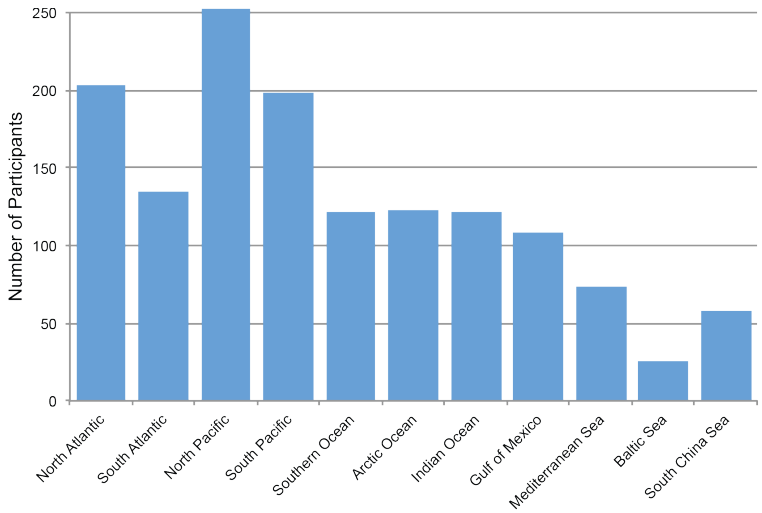
Figure 4: Histogram showing percentage of each discipline that has sailed during DSDP, ODP, and IODP.



D. Geographic Interest

The participants were asked to select their geographic interest (Figure 5) from the following regions: North Atlantic, South Atlantic, North Pacific, South Pacific, Southern Ocean, Arctic Ocean, Indian Ocean, Gulf of Mexico, Mediterranean Sea, Baltic Sea, and South China Sea. Participants could select more than one region and could also select the option "other", to which most replied they were interested in equatorial regions, all the oceans, or were not focused on geography. Results indicate a broad range of geographic interests, with the North Pacific receiving the largest response.

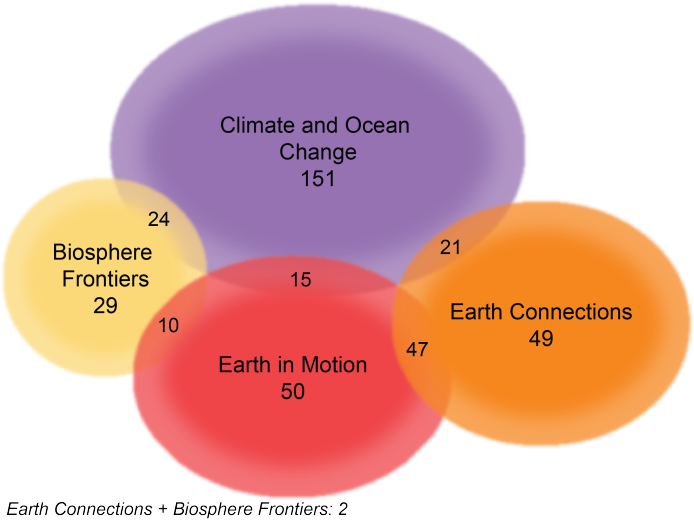
Figure 5: Histogram showing geographic interests of the survey participants.



E. 2013-2023 Science Plan Themes

The *2013-2023 Science Plan* identifies fourteen challenges, categorized among four themes: Climate and Ocean Change, Biosphere Frontiers, Earth Connections, and Earth in Motion. The survey participants were asked with which of the themes they most strongly identify. Each participant could identify with more than one theme; hence, the total number of responses exceeds the number of participants. A look at the four themes individually reveals the overall balance of community interests, where 223 participants (52%) identified with Climate and Ocean Change, 77 participants (18%) with Biosphere Frontiers, 134 participants (31%) with Earth Connections, and 137 participants (32%) with Earth in Motion. In contrast, the tally of each permutation of possible responses illustrates the connections among themes and the highly interdisciplinary nature of IODP research (Figure 6).

Figure 6: Participant responses to which *2013-2023 Science Plan* themes they most identify.

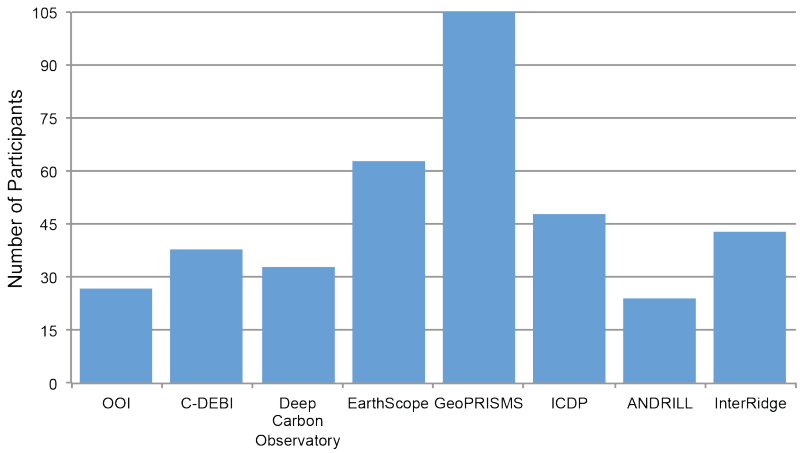


Earth Connections + Biosphere Frontiers: 2
Selected more than two themes: 16

F. Involvement in Other Initiatives

The survey participants were asked about their involvement with other collaborative research programs and community initiatives. Figure 7 shows the programs listed on the survey form that received the highest number of responses; another twenty-seven programs were mentioned in the optional "other" space provided (e.g., PAGES, GEOTRACES). The number of other programs cited and their diversity of research interests further reflect the interdisciplinary nature of IODP, as seen in answers to other questions as well.

Figure 7: Histogram showing the number of survey participants involved in other research programs and community initiatives.

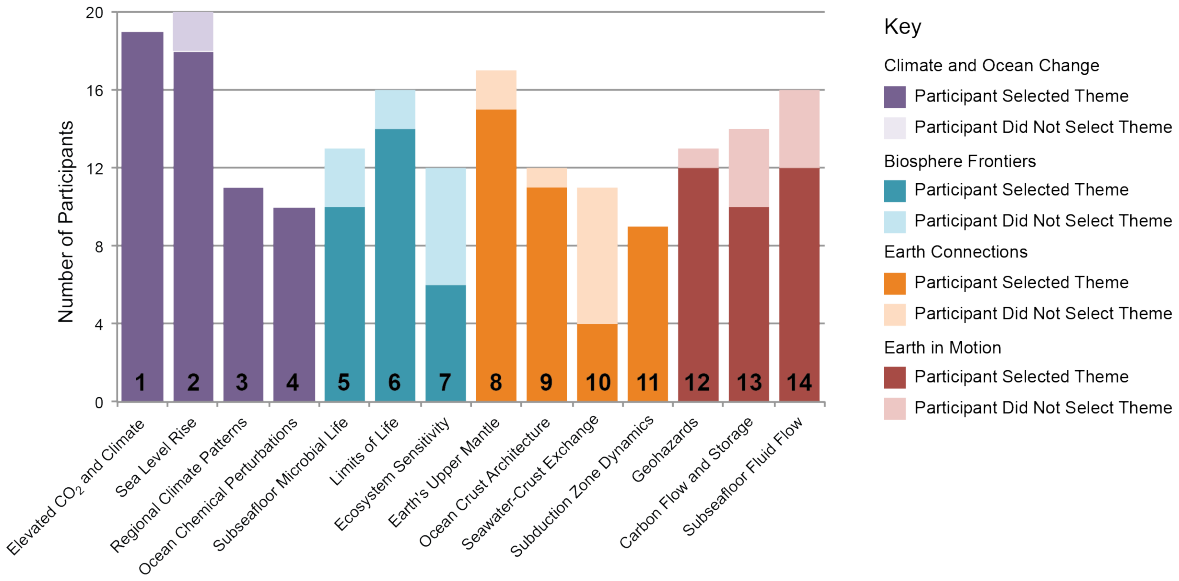


Section IV: Results

A. New Workshop Planning

The survey asked two questions about workshop planning. The first question simply asked if the participant was interested in developing a workshop proposal. This question was not tied to any specific science question, and 24% percent responded affirmatively. The second question was tied specifically to the *2013-2023 Science Plan* challenges (Figure 8). Within the Climate and Ocean Change theme, Challenge 1 (Elevated CO_2 and Climate) and Challenge 2 (Sea Level Rise) received the greatest amount of interest in workshop planning. Challenge 6 (Limits of Life) and Challenge 8 (Earth's Upper Mantle) were selected the most within Biosphere Frontiers and Earth Connections, respectively. Within Earth in Motion, Challenge 14 (Subseafloor Fluid Flow) was selected the most, but Challenge 12 (Geohazards) and Challenge 13 (Carbon Flow and Storage) were in a similar range. Challenges 7 (Ecosystem Sensitivity) and 10 (Seawater-Crust Exchange) had at least half the workshop interest from scientists outside their respective themes (as indicated by the lighter color), suggesting that these are strongly interdisciplinary challenges.

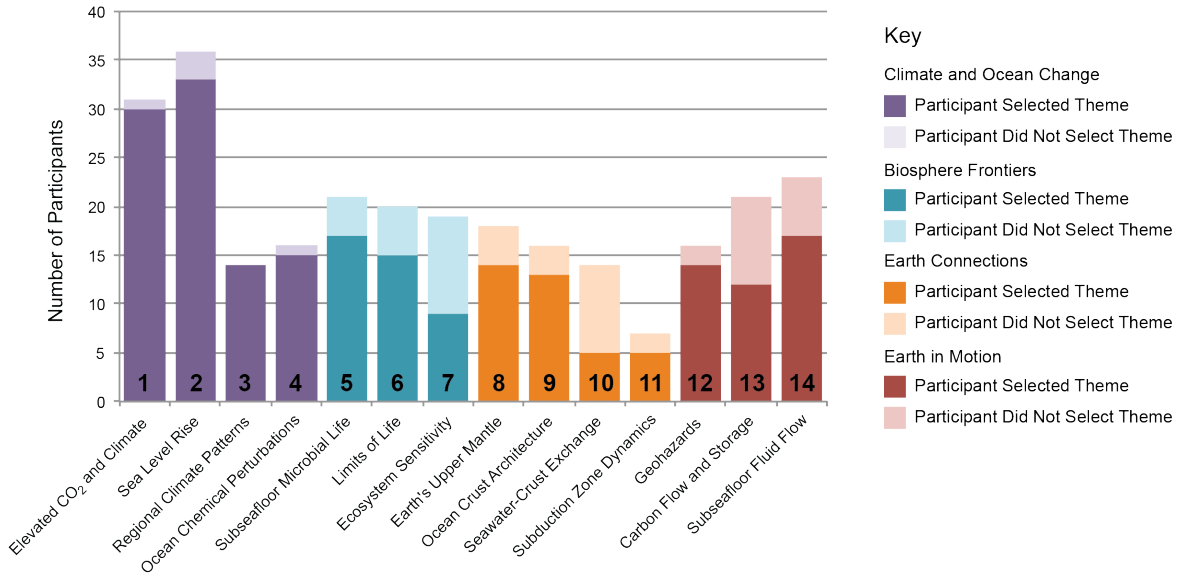
Figure 8: Histogram of the number of participants who said they would be interested in developing a workshop proposal related to individual challenges in the *2013-2023 Science Plan*.



B. New Proposal Planning

Like workshop planning, interest in expedition proposal planning was evaluated twice in the survey. In response to a general question, 50% of the survey participants expressed interest in developing a drilling proposal. For the second question, the participants were asked about challenges in the *2013-2023 Science Plan* for which they would be interested in proposing a drilling expedition (Figure 9). Each participant could select more than one challenge, and not all the participants who answered the first question answered the second one. Within Climate and Ocean Change, Challenge 1 (Elevated CO_2 and Climate) and Challenge 2 (Sea Level Rise) showed the most interest. The other themes show less variation among their challenges, with Challenge 5 (Subseafloor Microbial Life), Challenge 8 (Earth's Upper Mantle), and Challenge 12 (Geohazards) generating slightly more interest. As with the workshop proposals, Challenges 7 (Ecosystem Sensitivity) and 10 (Seawater-Crust Exchange) showed a high percentage of interest from scientists outside their themes.

Figure 9: Histogram of the number of participants who said they would be interested in developing an expedition related to each challenge list in the *2013-2023 Science Plan*.



C. Community Interest Level for Science Challenges

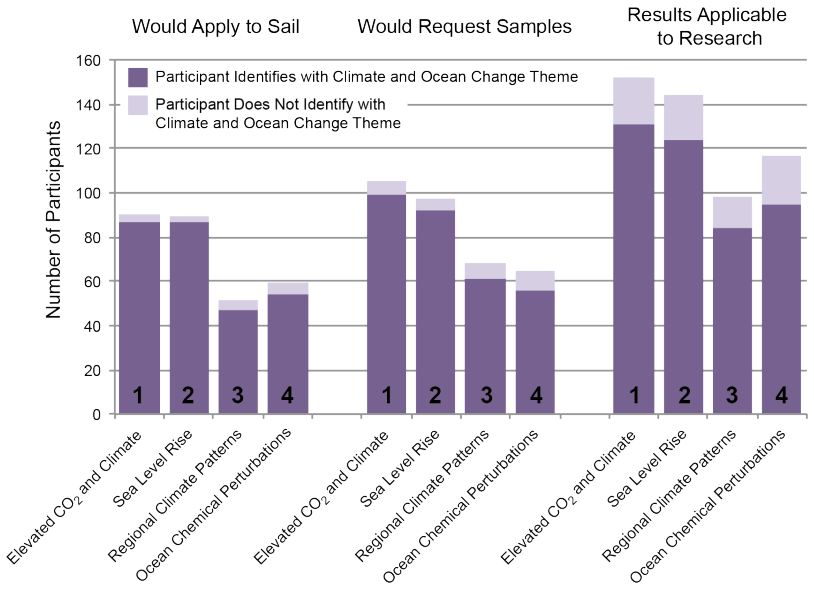
The survey assessed the community's interest level for each of the challenges in the *2013-2023 Science Plan* by asking about their preference for developing workshop and expedition proposals, as described in the previous two sections. Although proposal pressure serves as an indicator of community interest, the survey sought a more complete picture by inquiring about interest in sailing (or having a student sail) on an expedition related to each challenge, interest in requesting data or samples from an expedition

related to each challenge, and interest in using results from an expedition related to each challenge.

1. Climate and Ocean Change

Within Climate and Ocean Change (Figure 10), Challenge 1 (Elevated CO_2 Levels and Climate) received more interest in the questions about sailing, data requests, and applicable results, while Challenge 2 (Sea Level Rise) is slightly favored in the questions related to workshop and expedition proposal preparation (Figures 8 and 9). As indicated by the light colors on the histogram, a significant number of scientists who do not identify themselves with the Climate and Ocean Change theme find the results applicable to their research.

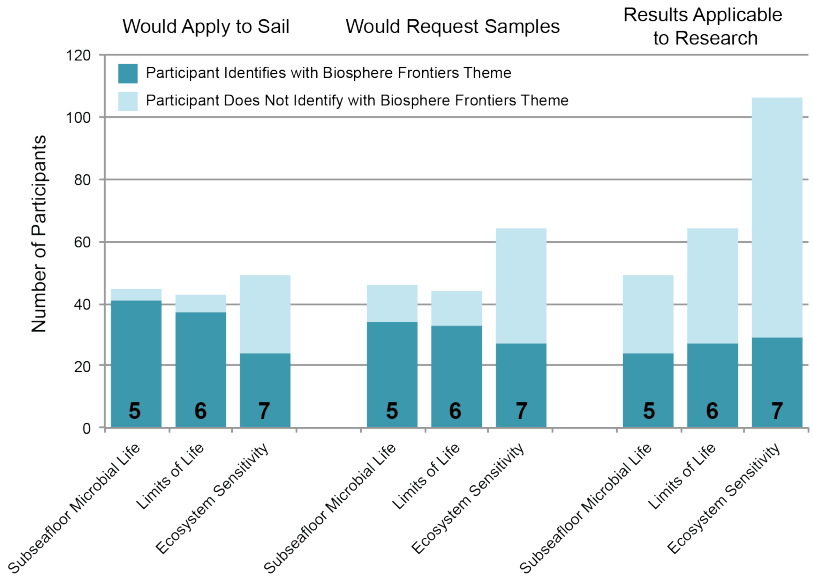
Figure 10: Participant interest for the Climate and Ocean Change challenges.



2. Biosphere Frontiers

Within Biosphere Frontiers, Challenge 5 (Subseafloor Microbial Life) and Challenge 6 (Limits of Life) received the most responses in the questions about proposal writing (Figures 7 and 8), whereas Challenge 7 (Ecosystem Sensitivity) received the most responses in the questions about sailing, data requests, and applicable results (Figure 10). As indicated by the lighter-blue-shading portion of the bars, many scientists who do not identify themselves with Biosphere Frontiers are interested in these challenges and would sail, request data, or find the results applicable to their research. We interpret this as reflecting the interdisciplinary nature inherent in Challenge 7 (Ecosystem Sensitivity), such that any expedition related to this challenge would likely garner interest through participation and data use from those who primarily identify with the other themes, particularly Climate and Ocean Change.

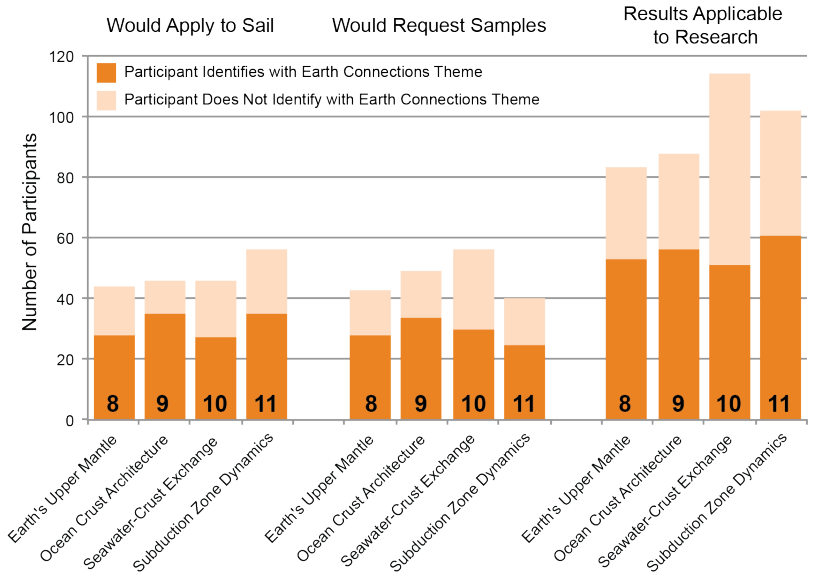
Figure 11: Participant interest for the Biosphere Frontiers challenges



3. Earth Connections

The preferred challenge within Earth Connections changes based on the question asked. Challenge 8 (Earth's Upper Mantle) and Challenge 9 (Architecture of the Ocean Crust) generated the greatest interest in proposal writing (Figures 7 and 8), whereas Challenge 10 (Seawater-Crust Exchange) and Challenge 11 (Subduction Zone Dynamics) received the most responses in the questions about sailing, data requests, and applicable results (Figure 11), with a significant proportion of the respondents from outside the Earth Connections theme (light orange). We interpret this as reflecting the interdisciplinary nature of Challenges 10 and 11. Any expedition related to Challenges 10 and 11 would likely garner interest (through participation and data use) from researchers who identify with other themes. The disparity between interest in proposal writing (Figure 8) and the scientific outcomes suggests that proposal pressure alone provides an incomplete picture of community interest.

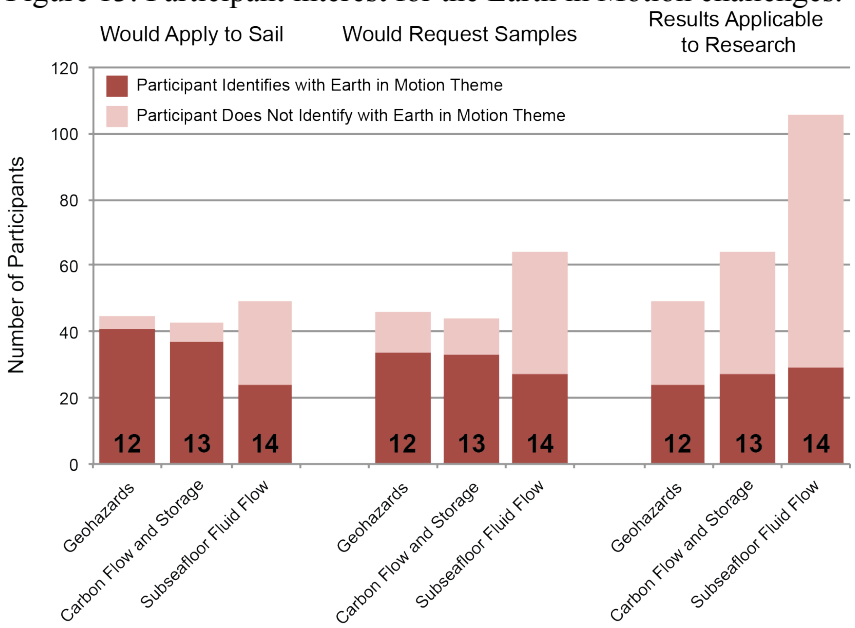
Figure 12: Participant interest for the Earth Connections challenges.



4. Earth in Motion

Within the Earth in Motion theme, respondents indicate a preference for Challenge 14 (Subseafloor Fluid Flow) with respect to proposal development, participation during an expedition, and use and relevance of data after an expedition (Figures 7, 8, and 12). If only responses from participants who selected Earth in Motion are considered (the darker red in each of the figures), the degree of preference among the challenges decreases, in some cases resulting in a slight preference for Challenge 12 (Geohazards).

Figure 13: Participant interest for the Earth in Motion challenges.



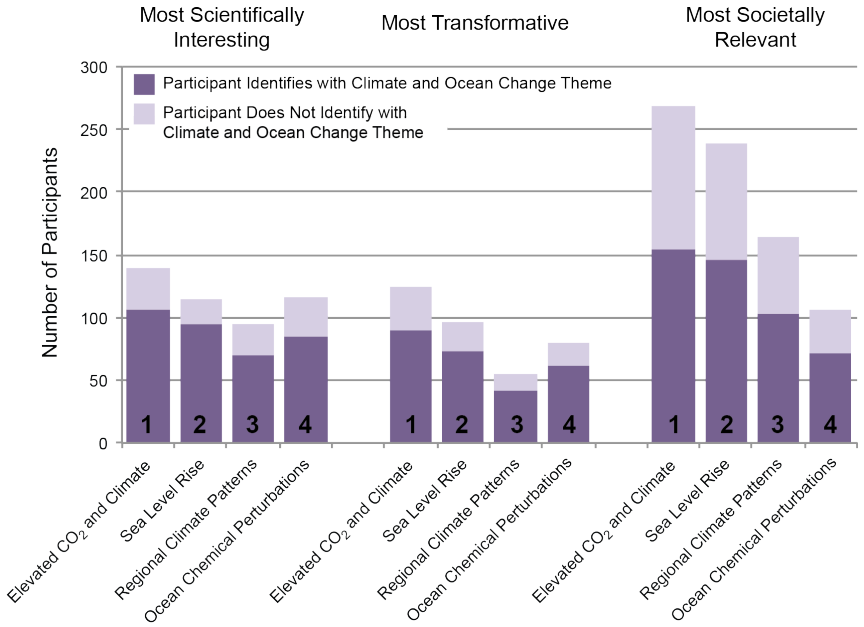
D. Community Evaluation of Science Challenges

A second set of survey questions were designed to encourage the participants to consider the overall impact of the science more broadly. Specifically, the participants were asked which of the challenges they find (a) most scientifically interesting, (b) most likely to transform the geosciences, and (c) most societally relevant. More than one challenge could be selected for each statement.

1. Climate and Ocean Change

The survey participants selected Challenge 1 (Elevated CO_2 and Climate) as most scientifically interesting, most transformative, and most societally relevant within the Climate and Ocean Change theme (Figure 14). The trends are unchanged when only the responses from those identifying themselves with Climate and Ocean Change are considered, as noted by the dark purple, suggesting that the broader community and specialists agree in these areas.

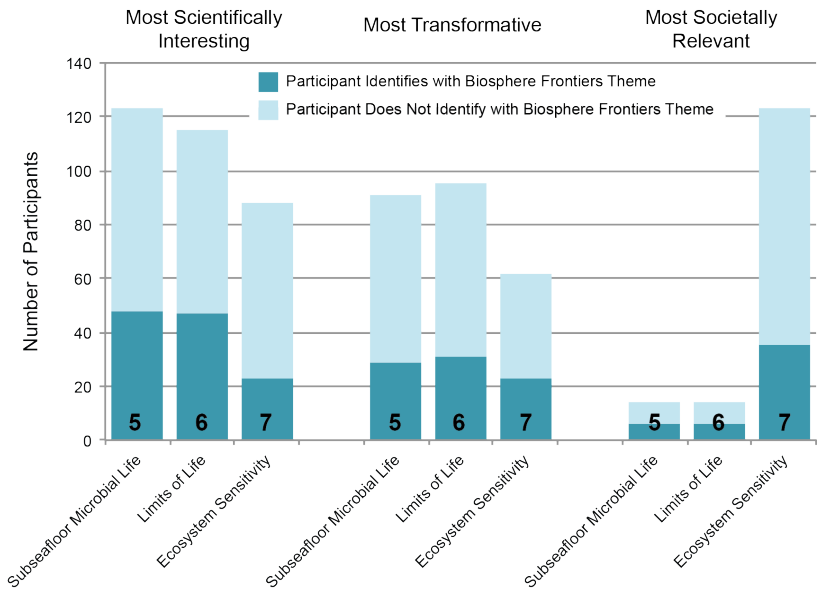
Figure 14: Community evaluation of the Climate and Ocean Change challenges.



2. Biosphere Frontiers

Within Biosphere Frontiers (Figure 15), Challenges 5 and 6 (Subseafloor Microbial Life) and the limits of life were selected as most scientifically interesting and most transformative. Challenge 7 (Ecosystem Sensitivity) was selected as most societally relevant by the U.S. community. As with Climate and Ocean Change, the trends are similar between those who identify with the theme and all respondents.

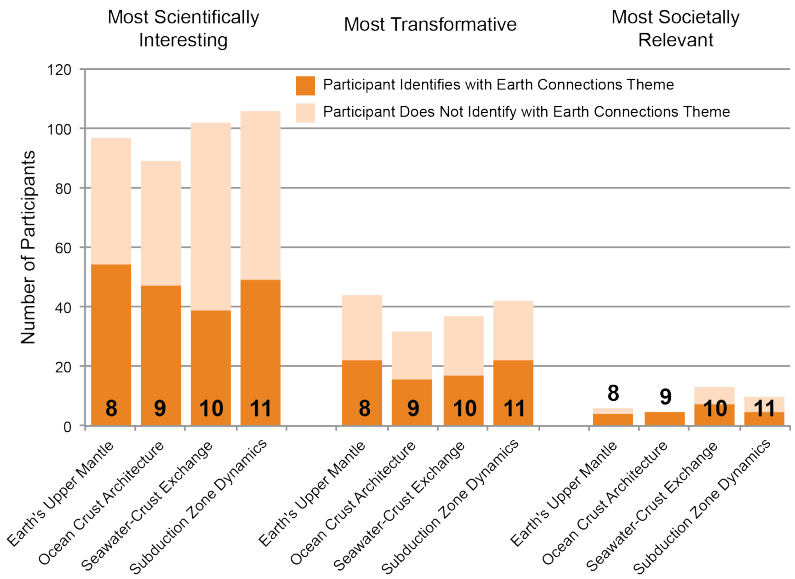
Figure 15: Community evaluation of the Biosphere Frontiers challenges.



3. Earth Connections

The Earth Connections theme shows very little difference among the challenges with respect to most scientifically interesting, most transformative, and most societally relevant (Figure 16). Some small differences are seen between trends when those who identify with the theme and the broader group are considered.

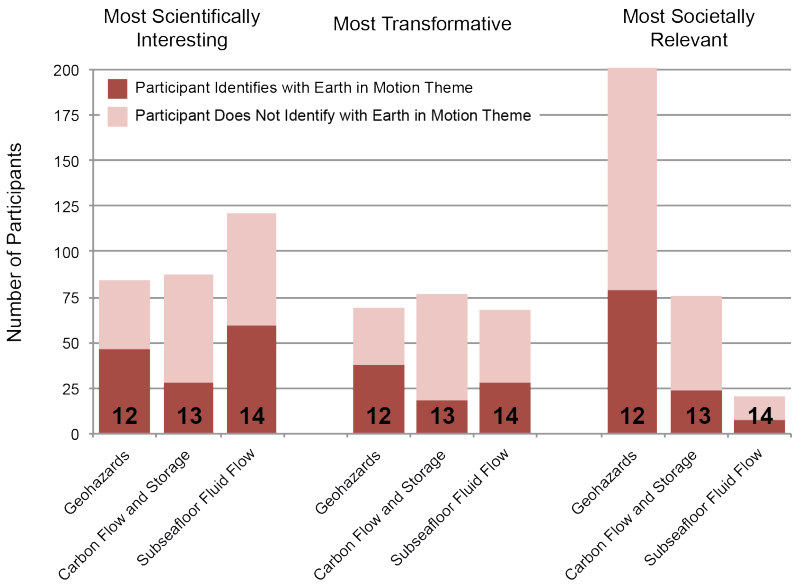
Figure 16: Community evaluation of the Earth Connections challenges.



4. Earth in Motion

The survey participants selected Challenge 14 (Subseafloor Fluid Flow) as most scientifically interesting, Challenge 13 (Carbon Sequestration) as most transformative, though results are very close to each other, and Challenge 12 (Geohazards) as most societally relevant within the Earth in Motion theme (Figure 17). In general, response trends from those who identify with the theme are similar to those from the broader group.

Figure 17: Community evaluation of the Earth in Motion challenges.



E. New Developments since the INVEST Conference

Survey participants were asked to describe the most significant new development in their field since the INVEST Conference and whether this development was associated with a new drilling technology. As the *2013-2023 Science Plan* was developed from the INVEST Conference proceedings, this question was asked to identify discoveries and new technologies from the past two years that might be important for future planning activities.

The participants provided an impressive list of recent discoveries ranging broadly from advances in laboratory and drilling technology to results from recent IODP expeditions and major events such as natural disasters (Figure 18 and 19). Many of the developments listed on the survey initiated prior to the INVEST Conference, but the recognition of the impact of their outcomes came only recently.

Figure 18: Distribution of research topics identified by survey participants as experiencing new developments since the INVEST Conference.

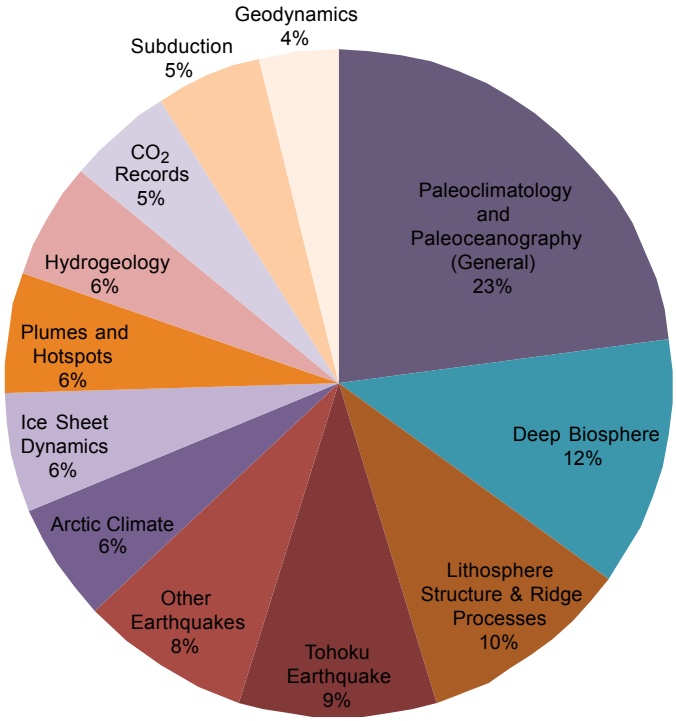
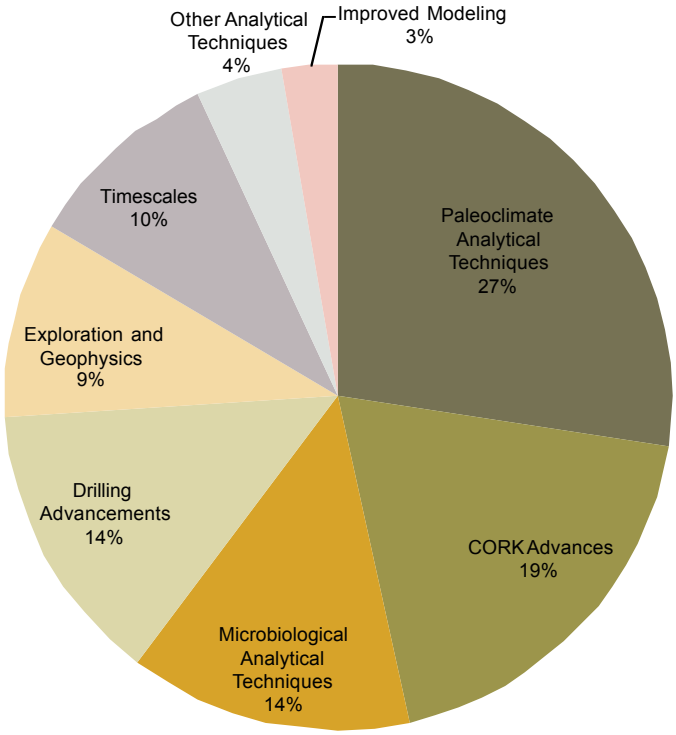


Figure 19: Distribution of technology advances identified by survey participants as enhancing new developments since the INVEST Conference.



Within Climate and Ocean Change, participants noted recent expeditions to high-latitude regions and advances in recovering core from greater drilling depths, both of which provided access to new high-resolution records that improved knowledge about past carbon dioxide levels, ocean temperatures, and ice-sheet dynamics. The development of new proxies and analytical techniques led to enhanced examination of these new drill cores as well as from archived core stored in the IODP repositories. In addition, the unprecedented resolution in recently collected sediment cores allowed for adding more accurate and detailed timescales to paleoclimate records over the last few million years and an improved understanding of the Earth's past magnetic field.

Knowledge about the genomics and biogeography of the deep biosphere has improved significantly since the INVEST Conference, with many of the participants pointing toward the improved sequencing technology that have made that possible. Observatory technology also continues to improve our understanding of the deep biosphere, fluid circulation within ocean crust, and interactions between fluid flow and deformation in subduction zones. Results from these observatories have implications for the Biosphere Frontiers, Earth Connections, and Earth in Motion themes. Participants particularly noted borehole observatory installations on the Juan de Fuca ridge flank and the mid-Atlantic Ridge.

Within Earth Connections, participants included advances in understanding the formation of the crust at spreading centers, mantle processes including the motion of hotspots and plumes, and the cycling of volatiles at subduction zones. Recently recovered gabbros and peridoties have illuminated the complex melt–rock interactions that occur in the ocean crust and upper mantle, and multiple drilling expeditions established that oceanic detachment faulting, serpentinization, and oceanic core complex formation are a fundamental part of the overall seafloor spreading process.

Relevant to planning within the Earth in Motion theme, scientific investigations and data from recent earthquakes and tsunami (in Sumatra, Tonga, Chile and Japan) have provided new insights into the dynamics and mechanisms of these large events. At the same time, smaller episodic tremor and slip events continue to revise the very definition of fault slip processes. In addition, the unexpected size and location of the March 2011 Tohoku earthquake is altering our interpretation of earthquake processes, with investigations there only just beginning.

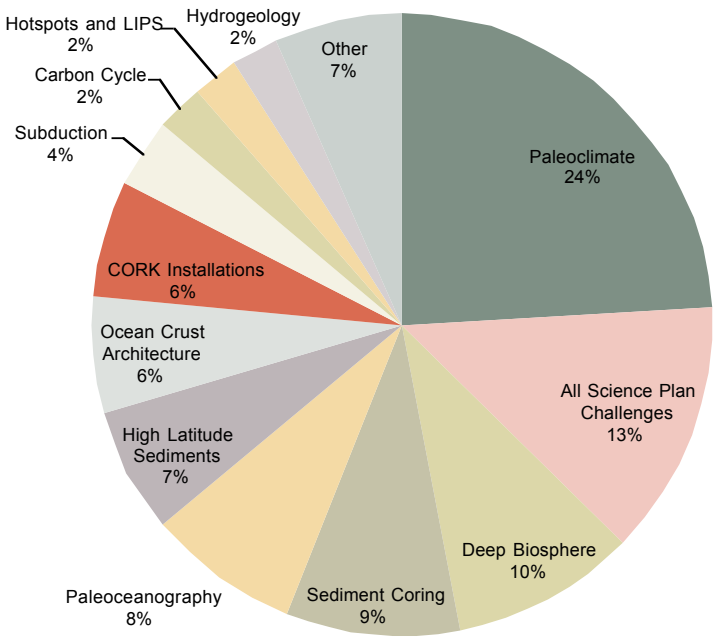
On the technology side, many participants also noted new geophysical capabilities that improved downhole measurements of pore pressure and permeability and that also allow for imaging of the deep biosphere. Exploration advances include improved resolution in bathymetric surveying, mapping of electric magnetism, and four-dimensional seismic reflection surveys.

F. The Next 5-Years

The *Building U.S. Strategies* workshop will focus on near-term and long-term priorities. With this mind, the survey participants were asked to state what they think is the most important science that each platform (*Chikyu*, *JOIDES Resolution*, mission specific platforms) can accomplish in the next five years.

The *JOIDES Resolution* received the widest variety in answers (Figure 19). Topics pertaining to all of the *2013-2023 Science Plan* themes were mentioned by participants, including paleoclimate, deep biosphere, crustal architecture, and geohazards. Survey participants also envision the use and deployment of borehole instrumentation as an important part of future expeditions on the *JOIDES Resolution*. Answers geared towards the *Chikyu* were focused mostly on subduction zone and seismogenic processes. Because the question concerned the "next 5 years", this may include the 2012 and 2013 Japan Trench and Nankai Trough drilling. A significant number of participants advocated for deep crustal investigations. Answers geared toward mission specific platforms primarily focused on paleoclimatology and paleoceanography investigations. Locations included high-latitude regions, in particular the Arctic, continental margin and shelf environments, and coral reefs.

Figure 19: Distribution of research topics suggested by survey participants for the *JOIDES Resolution* to address in the next five years.



Section IV: Conclusions

The *Building U.S. Strategies* Survey documents the demographics and interests of scientists actively involved in the current Integrated Ocean Drilling Program (IODP) and those interested in becoming involved in its successor program. In total, 433 scientists responded, representing 117 universities, institutions, and government agencies located in thirty-nine states and Washington, DC. A particularly striking statistic is that 44% of the respondents are students or "early career" researchers who finished their Ph.D. less than ten years ago. The survey further reveals a multifaceted community that is eager to tackle challenging research problems:

- **Interdisciplinary**: Respondents were asked to select the *2013-2023 Science Plan* themes with which they most closely identified. With 31% selecting more than one theme, it is clear that many in the IODP community now take a truly interdisciplinary approach to their research. In addition, IODP has broadened its reach over the last decade to include a new and growing group of microbiologists interested in using drilling to characterize the subsurface biosphere. An impressive 18% of all respondents selected the Biosphere Frontiers theme; notably, 42% of those respondents self-identify as microbiologists. This demonstrates that there is a strongly interdisciplinary group of researchers poised and ready to make great breakthroughs in our understanding of this previously unknown biologically active realm.

- **Shipboard and Shore-based**: More than half (51%) of the respondents have never sailed on a drilling expedition, and 27% are interested in developing synthesis studies on legacy samples and data. The use and impact of scientific ocean drilling data reach far beyond the confines of one expedition and its associated science party. These data show that some commonly held perceptions of IODP demographics are not quite accurate, while painting a clear picture of a broad community that is engaged and ready to embrace future research challenges.

- **Innovative**: The IODP research community is thinking beyond just drilling holes, collecting cores, and logging downhole data. For example, the Earth in Motion theme builds on technology developed during ODP and IODP to use boreholes to monitor subsurface conditions over long time periods, and to start designing active experiments with the Earth. The IODP community is also engaged in many other large initiatives that have linkages with ocean drilling. More than 100 respondents indicated involvement in GeoPRISMS, and more than 10% are involved in EarthScope, the International Continental Drilling Program (ICDP), or InterRidge.

In summary, the scientific ocean drilling community is large, geographically broad-based, and multidisciplinary. It includes a good number of experienced scientists, as well as a strong cohort of researchers who represent the next generation of leadership for the program. Many rely on samples and data from scientific ocean drilling to conduct

research at the cutting edge of their fields. Scientific ocean drilling is an important and unique research tool, and the U.S. community is committed to maximizing the benefits from this capability that is critical to the future success of ocean and earth science research.