U.S. Science Support Program – Workshop Report

Demystifying the IODP Proposal Process for Early Career Scientists: Gulf of Mexico and the North Atlantic

Austin, Texas, January 23 – 25, 2017

Workshop US/local organizing committee

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Contents

1. Executive Summary

Scientific ocean drilling is central to the study of Earth's climate history, tectonic evolution, and deep biosphere. A large, dynamic, and diverse ocean drilling community is vital to the health of the program; engaging early career scientists in cruise planning and leadership roles is critical to the future success of the International Ocean Discovery Program. For early career scientists who are new to the community, developing an IODP proposal from conception to drilling is a daunting task that can discourage many new researchers, particularly those from non-traditional ocean drilling research areas. This workshop aimed to foster discussion and engagement of early career researchers and mentors in the community to demystify the proposal submission and cruise planning processes. The best way to learn is by doing: the structure of this Early Career Researcher Workshop (ECRW) was designed to guide participants through initial concepts to workable drilling proposals. The geographic focus for this particular workshop was the Gulf of Mexico and Atlantic regions, in order to take advantage of the expected ship track of the *JOIDES Resolution* in 2020 and beyond. The primary objectives for this workshop were to 1) provide early career scientists with hands-on experience in IODP proposal planning writing, 2) build a community of early career researchers that will be able to develop active research programs in coordination with the evolving landscape of ocean drilling research, and 3) develop drilling/workshop proposals to investigate the paleoceanographic, paleoclimatic, and tectonic history of the Gulf of Mexico and North Atlantic regions, particularly in regard to paleoclimate connections between the two regions.

The workshop was held at the University of Texas Institute for Geophysics in Austin on January 23 - 25, 2017. The workshop brought together 48 early career scientists (11 faculty, 15 post docs, and 12 graduate students) with mentors and advisors from the IODP community, USSSP, NSF, and the Institute for Geophysics. In total, over 50 participants from diverse disciplines, backgrounds, and career stages (Figure 1).

Groups in the workshop developed plans for **five** preliminary proposals and **one** APL proposal for drilling in the Gulf of Mexico and North Atlantic Ocean; to date one of these has been submitted (917-PRE Florida Straits Throughflow). These proposals promote cross-disciplinary coordination aligned with IODP Science Plan and are driven by early career proponents. Initial pre-proposals and workshop proposals developed through collaborative input at the ECRW are in in the process of being submitted to the USSSP.

Figure 1. Early career workshop participants engaging in a proposal discussion.

2. Background

Analyses of continuous deep-sea sediment records have revolutionized our understanding of the ocean, atmosphere, and terrestrial environments. This is particularly true for multi-million-year timescales that typically occur at sediment depths inaccessible with other techniques. The Gulf of Mexico Basin and North Atlantic are fed by a catchment that has comprised most of central North America through at least the Early Cretaceous. Archives of terrestrial climate as well as paleoceanographic variability through a number of critical intervals. Coring Gulf of Mexico and North Atlantic sediments will provide the opportunity to assess the long-term evolution of North American and global climates, the impact transitions and transient climatic events have had on the climate system, potential downstream effects on oceanic circulation stemming from processes occurring within the Gulf of Mexico basin, and interaction between low- and high-latitude processes. Additionally, a number of untested hypotheses remain about the early oceanographic evolution of the Gulf of Mexico, the development of oceanic crust in the basin, and the nature of basement features identified in geophysical surveys (Hudec et al., 2013).

Almost a century of drilling in the Gulf of Mexico has focused on oil and gas exploration, yet (as a result) there have been relatively few scientific drilling expeditions in the region. The relatively scant scientific drilling from early DSDP expeditions (e.g. Leg 1, Site 1) to the recently completed IODP Exp. 364 (Chicxulub Impact Crater) have left a patchy dataset. Many of the DSDP sites in the GoM were spot-cored; therefore, these sites are not suitable for the development of long and continuous time series records. Later, ODP and IODP expeditions focused on short time scales and sedimentary processes. A wealth of geophysical surveys and wireline well data collected by the oil industry provide good constraints on Gulf of Mexico stratigraphy, but industry-collected cuttings and short cores are both unsuitable for modern paleoclimate work as well as often being unavailable to researchers. The wealth of available surveys combined with the spot-core data from previous expeditions mean that the Gulf of Mexico could be characterized much more completely than other ocean basins with a series of strategically chosen sites placed within the context of the larger existing scientific data.

Although cores and outcrops along the US Gulf Coastal Plain have been studied extensively, there is comparatively little known about the deep water Gulf of Mexico throughout much of its history. In particular, circulation patterns prior to the Pliocene (Joyce et al., 1990) are poorly known, or inferred from models (e.g., Molnar, 2008). Correcting this data gap will provide a significant contribution towards our understanding of the evolution of North American climate, as well as the far-reaching influence on North Atlantic and Pacific circulation. With the wealth of regional stratigraphic knowledge and geophysical surveys, and with the planned track of the *JOIDES Resolution* bringing the ship to the Gulf of Mexico and North Atlantic around 2020, the time is right to bring the community together in order to identify the most pressing scientific questions that can be addressed by the IODP in this region, and develop proposals for drilling targeted intervals of interest to the broader scientific community.

2.1. The Mesozoic

The Gulf began forming during the Late Triassic/Early Jurassic as the Yucatán microplate began to rift apart from the North American Plate (e.g., Pindell and Dewey, 1982). An initial restricted basin filled with thousands of meters of salt that was separated by subsequent rifting into the Louann Salt Basin to the north and the Campeche Salt Basin to the south (e.g., Hudec et al., 2013). Subsequent deposition of Jurassic-Cretaceous carbonates and siliciclastics began as the basin deepened, with well-studied shallow water carbonate facies along the newly-formed continental shelf, with generally unknown or very poorly sampled distal facies in the deep water (e.g., Buffler et al., 1984). These under-studied distal facies represent both pelagic and hemi-pelagic carbonates and coarse to fine terrigenous clastic sediments which should contain excellent records of regional oceanography and the climate evolution of North America.

Gulf of Mexico Cretaceous oceanography is also poorly known. Although some Early Cretaceous cores were recovered from the Florida Straits during Legs 10 and 77, they were spot-cored and generally unsuitable for the development of long time-series. These poorly recovered records provide tantalizing glimpses into deep-water sedimentation and geochemistry throughout the evolution of Cretaceous climate. Lithologies of soft chalk and organic-rich mudstone indicate a number of paleontological, geochemical, and sedimentological archives which can be used to reconstruct Cretaceous climate and oceanography (Buffler, 1984). These archives are easily accessible by ocean drilling, perched on salt domes and basement highs across the Gulf (compared to non-carapace Cretaceous sediments, which occur below kilometers thick Cenozoic sequences).

Understanding Cretaceous circulation patterns would fill a major gap in our knowledge of Cretaceous paleoceanography between the well-studied North Atlantic/Tethys and Western Interior Sea. During oceanic anoxic events, the Western Interior is out of phase with the global ocean (Lowery et al., 2014). Higher organic matter accumulation and anoxia dominate the Western Interior prior to and after OAEs, with distinct local increases in oxygen during these global ocean event. It is unknown whether these conditions extend into the Gulf of Mexico or terminate at the sill at the mouth of the seaway in Texas (Lowery et al., 2014).

2.2. The Cenozoic

Paleoceanographic proxy records spanning the Cenozoic have provided clear evidence that climate has been highly variable through time, yet details regarding the role of regional variability in the context of large-scale climate change are still poorly understood. The high frequency variability of the climate system has long been argued to be a response to external/solar/orbital forcing mechanisms, as well as by internal linear and nonlinear dynamics of the global climate system (e.g., Denton and Karlen, 1973; Cane and Clement, 1999; Bond et al., 2001). Thus, detailed high resolution paleoceanographic reconstructions from key regions (like the Gulf of Mexico) spanning major climatic events and transition throughout the Cenozoic are required to better assess the regional forcing, feedbacks and thresholds under various climate scenarios that potentially have large scale, and long-lasting effects on the climate system.

The meridional circulation and overturning of the global ocean are integral towards the global distribution of heat, salts, and gases. Central to this is overturning in the North Atlantic region, which is ultimately at the mercy of processes occurring in the upstream GoM region where warm surface waters enter the Atlantic Ocean prior to northward transport via the Gulf Stream. Furthermore, the coupling of surface-ocean and atmospheric processes in the GoM region has a significant influence on the strength and position of the Intertropical Convergence Zone (ITZC), as well as moisture availability to a large area of North America, Greenland, and the North Atlantic (Peixoto and Oort, 1983). Thus, circulation changes here have the potential to directly impact North American, Greenland, and North Atlantic climate history throughout the Cenozoic.

The overall aim of targeting Cenozoic Gulf of Mexico records is to obtain long-term high-resolution reconstructions of circulation, hydrology, and carbon cycling that can be placed into the broader context of global paleoclimatic and paleoceanographic changes. Intervals of particular interest should include episodes of major global warmth (i.e., Paleocene/Eocene Thermal Maximum, early-Eocene climatic optimum, middle Miocene climatic optimum, Early to mid-Pliocene warmth, Holocene climatic optimum, etc.) and critical periods in Earth's climatic history (Eocene-Oligocene Transition, Oligocene-Miocene Transition, Closure of the Central American Seaway, Late Pliocene cooling, mid-Pleistocene Transition, etc.). The Paleocene/Eocene Thermal Maximum (PETM, ~56 Ma) is associated with massive injections of depleted carbon into the ocean-atmosphere system, in which the North American continental margin became a massive carbon sink experiencing high rates of sediment accumulation and more extreme warming than compared to the open ocean (John et al., 2008). Sediment cores from the GoM region spanning the PETM demonstrate this extreme sea surface warming with euxinic photic zone conditions (Sluijs et al., 2013), yet the local Calcite Compensation Depth (CCD) history of the Gulf is unresolved.

Equatorial Pacific $\delta^{18}O$ records from benthic foraminifera tie Antarctic ice sheet growth during the Eocene Oligocene Transition (EOT or "Oi-1 event", ~34 Ma) to a two-step cooling and deepening of the CCD. This deepening is preceded by a brief shoaling of the CCD, possibly as a result of extensive volcanism from the Central American Magmatic Province (Sigurdsson et al., 2000). Such an event is hypothesized to have deposited large amounts of ash into the GoM. Thus, drilling the E/O boundary in the GoM could permit a test of this hypothesis.

The Oligocene Miocene Transition (OMT or "Mi-1 event", ~23 Ma) is characterized by a profound cooling and ice growth event reflected in the $\delta^{18}O$ record from benthic foraminifera, yet this event is poorly understood from most regions outside the south Atlantic or tropical Pacific Ocean (Beddow et al., 2016). Terrestrial records of this event do not record changes in North American climatology, whereas some studies suggest the gradual intensification of Northern Hemisphere glaciation started in the Miocene (Fronval and Jansen, 1996; St. John, 2008; Larsen et al., 1994; St. John and Krissek, 2002). Elevated sedimentation rates in the GoM region raise the possibility of generating high resolution records of North American terrestrial climate variability spanning the transition.

The mid-Miocene climatic optimum (MMCO) serves as a useful analogue for future warming scenarios as it is a period of substantial global warmth (4-5°C warmer than today), with higher atmospheric CO_2 levels (~350-400 ppm) superimposed on a long-term cooling trend (Foster et al., 2012; IPCC, 2014). However, Earth system models used to evaluate CO_2 as a forcing mechanism struggle to reproduce MMCO warmth (Goldner et al., 2013), implying the latest climate models are not sensitive enough and or additional forcings remain unknown in order to explain half of the anomalous warmth experienced during the MMCO (Goldner et al., 2013). North American, Gulf of Mexico, and eastern Atlantic Ocean proxy records are sparse in terms of contributing to the spatial distribution of terrestrial and sea surface temperature records used to evaluate model performance. Sediments in the North Atlantic Basin provide an ideal source for reconstructing North American terrestrial climate as well as oceanic regime changes.

Furthermore, orbitally-resolved time-series from the North Atlantic/Gulf of Mexico would provide a significant scientific contribution by addressing the following problems: what was the influence of Central American Seaway closure on Pacific and Atlantic Ocean circulation and moisture transport (i.e., Molnar, 2008); how has the position of the ITCZ changed on a wide range of time scales, including the Holocene (i.e., Poore et al., 2003); what was the influence of meltwater discharge from the North American ice sheets had on Atlantic meridional overturning circulation (i.e., Otto-Bliesner and Brady, 2010); timing in the initiation of and variable strength of the Gulf Stream (i.e., Kaneps, 1979; Watkins and Self-Trail, 2005). Lastly, one of the most long-standing questions facing Quaternary paleoclimate is the transition from 41- to 100-kyr glacial cycles during the mid-Pleistocene climate transition (MPT). Continuous high-resolution records from the Gulf of Mexico could serve to compliment the currently-in-development terrestrial records focused on addressing a range of hypothesis surrounding the MPT, and thus provide nearby regional marine based reconstructions.

3. Objectives

The primary goal of this workshop was to facilitate development of early career (EC) researchers within the context of IODP. We will foster interdisciplinary connections and proposals between the four theme groups by bringing together a diverse group of scientists to discuss potential drilling proposals with aim of increasing engagement of EC scientists in all facets of the process from proposal to drilling. Workshop participants provided short (4 min) research talks to introduce themselves and their research focus to the group, participated in interdisciplinary discussions facilitated by the workshop mentors to foster cross-field relationships, engaged in informal discussions with colleagues at the plenary dinner and throughout the workshop, and actively participated in developing IODP proposals that were evaluated during a mock proposal review and will serve as the building blocks for pre-proposals submitted later in the year. Participants left the workshop with a network of peers and potential collaborators, contact with mentors in the field, an understanding of how to develop drilling proposals, and a personal investment in a proposal to drill in the North Atlantic/Gulf of Mexico.

3.1. Engagement of Early Career Scientists

The IODP proposal process and higher-level board functions are often opaque to EC scientists, even those with a moderate level of experience in the program. This workshop was conceived, proposed, and organized by a group of EC researchers for EC researchers, to encourage future engagement with and participation in IODP by the next generation of ocean drilling researchers. By bringing together EC scientists and experienced mentors from the IODP community, the USSSP, and NSF we aimed to make the proposal writing process more accessible through a mix of research and mentoring talks including hands-on development of proposals to investigate the scientific questions summarized in the previous section. Research pressures on EC scientists demand research products (e.g., manuscripts) in order to attain a faculty job (~2-4 yrs post- Ph.D.) and then tenure (~5 yrs). The EC period is, therefore, the most difficult to invest time in IODP proposals, which may not be fully realized for a decade or more. As a result of these pressures, participation by EC scientists in proposal writing and IODP planning is limited. This workshop will accelerate that timeline with proposals targeted towards the near-term region of the *JOIDES Resolution's* path, allowing EC researchers to be involved in the proposal process with possible dividends in a period usable for this stage of their career. The primary objectives of the workshop are described as follows:

1) EC discussions occupied the mornings of the first two days with the goal of **facilitating engagement of early career scientists in the IODP**. These discussions focused on opportunities with IODP, as well as more general discussions surrounding strategies for EC scientists to think about the major scientific questions that should be addressed within the realm of IODP science in the coming decade. Discussions included presentations by members of IODP boards, USSP, and NSF, as well as spanning broader themes concerning best practices for mentorship and strategies for running a successful research program within the broader scope of IODP's goals.

2) The secondary goal of these sessions was to place EC scientists' academic and **research goals in the context of IODP Science Plan Prioritization relevant to GoM and NA drilling proposals**. International and interdisciplinary collaboration is fundamental to scientific ocean drilling, yet EC researchers are often isolated within their individual field of expertise and research groups. For example, successful drilling proposals require site survey data, which requires a proponent proficient in geophysics. A goal for these sessions was to promote collaborations between researchers within the diverse IODP specialties (paleomagnetics, microbiology, seismic stratigraphy, micropaleontology, sedimentology, geophysics, etc.), through both formal and informal discussions.

3) The North Atlantic and Gulf of Mexico were strategically selected as the region of interest ahead of the track planned by the *JOIDES Resolution* Facilities Board, and by focusing on

how to successfully shepherd interdisciplinary proposals through the IODP approval process. **The final objective of this workshop was to develop IODP proposals in the Gulf of Mexico and North Atlantic**, driven by early career proponents, with initial pre-proposals submitted within one year of the completion of the workshop and/or facilitate the identification of proposals/proponents already in the system. One such proposal is currently in the system (917-PRE, Florida Straits Throughflow, and a majority of proponents were workshop participants). Additional successful outcomes for this workshop include transit or APL proposals for existing mature proposals.

4. Facilitating engagement of Early Career Scientists in the IODP (Objective 1)

The first day of the workshop was designed to provide an overview of the IODP process and introduce participants to the proposal process. This session was introduced by mentor presentation on Scientific Ocean Drilling: Past, Present, and Future (Susan Humphris, WHOI), the IODP Proposal Process (Christina Ravelo, UCSC), APL and Transit/Transect Proposals (Keir Becker, Miami), and Site Survey and Safety Panel Requirements (Sean Gulick, UTIG). Presentations were followed be a panel discussion on Submitting a Good Proposal (Figure 2) with mentors Keir Becker (Miami), Sean Gulick (UTIG), Susan Humphris (WHOI), Gail Christeson (UTIG), Christina Ravelo (UCSC), and Jamie Austin (UTIG).

4.1 Proposal Best Practices

A successful proposal will have a clear outline of all proposed sampling, shipboard or shore-based measurements and/or logging data that are needed and planned.

A well-prepared preliminary proposal should include the following:

- A clear statement of the scientific objectives that explains how those objectives relate to, or advance beyond, the IODP Science Plan 2013-2023; be as specific about SP themes and challenges as possible.
- Justify the need for drilling to accomplish the scientific objectives.
- Present a well-defined strategy for addressing the scientific objectives through drilling, logging, and/or other down-hole measurements.
- Describe the proposed drilling sites, penetration depths, expected lithologies, and available site-survey data (but remember that Pre- proposals do not need to supply specific data to the Site Survey Data Bank in support of the proposal).
- Describe concisely any relationships to other international geoscience programs.
- Have diverse proponents whose disciplinary backgrounds cover the objectives adequately — with a well-defined LEAD and DATA proponent.

Reasons that a proposal might not advance in IODP include:

- Science to be addressed is incremental (i.e. makes only a small step forward).
- Science to be addressed is one-sided (i.e. does not account for alternative hypotheses).

- Proposals that display little effort on the part of the proponents to understand what makes science drillable (i.e., pursues science that is simply un-drillable).
- Proponents are unresponsive to reviewer comments for resubmission.
- Proposals that do not critically select drilling targets to answer well-defined questions, but instead take a 'shotgun' approach.
- Proposals that do not clearly state how the proposed measurements will be used to answer the proposed questions.
- Proposals with scientific objectives that conform poorly with the overall goals of the program's science plan, and/or do not bring added value to the science plan.
- The data that are needed to characterize the drill site (location and target depth), and place it in a proper structural or stratigraphic context, are not sufficient to underpin the science and to conduct operations safely.

4.2. Additional Resources available to proposal proponents

- Maps and .kml Tools - http://iodp.org/resources/maps-and-kml-tools
- Coring & Transit Time Estimator - http://iodp.tamu.edu/participants/coring_estimator.html
- IODP Science Plan - http://iodp.org/top-resources/program-documents/science-plan

Figure 2. Mentor panel discussing IODP proposal best practices with workshop attendees.

5. GoM and NA drilling: IODP Science Plan Prioritization (Objective 2)

- Early Career Participation in IODP (Angela Slagle) and NSF (Tom Janecek)
- Mentor and Mock Proposal review Boards
- 4-min science talks
- Interdisciplinary breakout groups

6. Synthesis of IODP Proposals for the GoM and NA (Objective 3)

The primary goal of this session was to develop preliminary drilling proposals to investigate the paleoceanographic, paleoclimatic, and tectonic history of the Gulf of Mexico and North Atlantic regions. Over a two-day timescale, proposal groups developed the basics of an IODP proposal and presented their proposals to a mock proposal review board for feedback. This was widely cited as one of the most beneficial aspects of the workshop in workshop evaluations. Example proposal group foci and objectives are outlined below.

6.1. Proposal: Labrador Sea Ice Expedition

Primary Objectives:

- Reconstructing overflow and iceberg history from the Jacobshavn Glacier
- Salinity variability among the major currents in the Labrador Sea
- Quantifying transgressive vs. instantaneous growth of Greenland Ice Sheet
- Identifying the interaction between surface and subsurface temperature on growth of ice sheets and marginal melt
- Understanding the nature of the interaction between the Laurentide Ice Sheet and the presence/absence of sea ice, and NADW formation/AMOC

Figure 3. Workshop participants brainstorming on proposal ideas.

6.2. Proposal: Climate and Tectonic History of the Yucatán Gateway

Primary Objectives:

- Climate-tectonic implications of the Yucatán gateway
- Climate forcing of Loop Current and Western Hemisphere Warm Pool dynamics
- Evolutionary implications of opening of the Yucatán Straits and Loop Current initiation
- Interplay between microbial activity/productivity, carbon cycle, and the extent of oxygen penetration into the sediment column across a flow profile
- Atmospheric circulation changes due to opening of the Yucatan gateway
- Timing/rate of gateway opening and relationship to regional tectonic regime

6.3. Proposal: Mid-Atlantic Shelf Climate/Methane Hydrates

Primary Objectives:

- An integrated study of the evolution of the North Atlantic Basin
- Paleogene – Neogene Evolution of climate and circulation in the North Atlantic
- Coordinate with pre-proposal in the S. Atlantic (Gail Christeson) as a model for what might be achievable in one cruise

6.4. History of Rio Grande fan and Western North America paleoclimate

Primary Objectives:

- Influence of deglaciation on freshwater/nutrient/sediment transport
- Pacing and style of N. American glaciation since Pliocene
- Characterization of iron, sulfur and methane gradients in the subsurface to test the hypothesis that glacial/interglacial riverine discharge affects microbial community structure by regulating nutrient delivery to the deep biosphere

6.5. Florida Straits Throughflow History

Primary Objectives:

- Quaternary/Modern loop current development/timing of loop current onset and variability over last 400 kyr
- Changes and timing in SST, SSS, and AMOC strength across last glacial cycle
- Influence of Mississippi River (or Southern Hemisphere) on AMOC since last interglacial
- Cretaceous sediments from warmer time periods (redrill 540/545)

6.6. APL – Redrill of IODP Site U1396

Primary Objectives:

- Determine if Central American Seaway closure and/or Inter-Tropical Convergence Zone were dominant control on Pliocene-Miocene Caribbean paleoceanography
- Determine role of elevated pCO_2 in Caribbean ocean structure
- Extension of Montserrat & Guadeloupe volcanic history, as final answer of key unanswered Exp. 340 goal

Figure 4. Mentor panel reviewing group proposals.

7. Workshop Outcomes

Five full IODP proposals and one APL for drilling in the Gulf of Mexico and Atlantic Ocean were discussed, promoting cross-disciplinary coordination aligned with IODP Science Plan. One proposal was submitted in April 2017 (917-PRE Florida Straits Throughflow).

8. Future Plans

Early career participation will always be vital to the health of scientific ocean drilling. Therefore, this workshop should be given a semi-annually (next one in 2019). *The workshop should **always** be developed and led by early career researchers (ECRs).* Two ECR leaders from the previous workshop should mentor three new ECRs in developing the next version of this workshop.

Identified Next Generation of Potential ECRW Leaders from 2017 participants:

- Kat Allen
- Jeanine Ash
- Aida Farough
- Irina Filina
- Heather Ford
- Robert Hatfield
- Rachel Scudder
- John Swartz
- Kaustubh Thirumalai
- Sonia Tikoo

8.1. Areas for improvement

- Additional discussions of shipboard capabilities and how to integrate with your science
- APC vs. XCB and other coring/drilling processes
- MSP and/or ECORD
- Staffing Balance
- Deadline and Moving forward — identify post workshop goals more clearly
- Focus on developing an actual proposal?
- Rather than 4-minute talks, have attendees send one “slide” ahead of time
- Have applicants do more homework/collaborative work before the workshop
- Include “Resources” talk more overtly
    - GeoMapApp *http://www.geomapapp.org/*
    - Site Survey Data Bank *https://ssdb.iodp.org/*
    - Ocean Data View *https://odv.awi.de/*
    - Seismic data

Appendix A. Workshop Program

<u>Monday January 23</u>

Developing an IODP proposal from conception to drilling — best practices, past and future of scientific ocean drilling.

7:45 Registration
8:00 Welcome - Terry Quinn (Director of the Institute for Geophysics)
8:15 Introduction to the workshop (Chris Lowery)
8:20 Workshop agenda and objectives (Andy Fraass)
8:30 Past and future of Scientific Ocean Drilling (Susan Humphris)
9:15 Overview of IODP Proposal processes (Christina Ravelo)
9:30 APL and Transit/Transect Proposals (Keir Becker)
10:00 Site Survey and Safety Panel Requirements (Sean Gulick)
11:00 Panel Discussion: Submitting a Good Proposal (Sean Gulick, Christina Ravelo, Susan Humphris, Keir Becker, Gail Christeson)
1:00 Participant Science Summary Talks (4 min each)
5:00 Plenary Dinner and Networking

<u>Tuesday January 24</u>

Involvement in IODP processes and introduction to breakout groups

8:00 Early Career Participation in IODP (Angela Slagle)
8:30 Early Career Scientists and the National Science Foundation (Tom Janecek)
9:15 Panel Discussion: Mentorship Best Practices and Roles as Co-Chief/PI (Sean Gulick, Christina Ravelo, Susan Humphris, Keir Becker, Gail Christeson)
10:15 Discipline Breakout Groups Introduction (Chris Lowery)
Describe Groups
1:00 Discipline Group Summarization of Ideas and Presentations
2:00 Interdisciplinary Breakout Groups
3:00 Synthesis of ideas and Identify Proposal Goals
Organize into Proposal Groups

<u>Wednesday January 25</u>

8:00 Proposal Groups Work Sessions
1:00 Mentor Feedback on Proposals
3:15 Mock Proposal Review Board (Sean Gulick, Christina Ravelo, Susan Humphris, Keir Becker, Gail Christeson, Jamie Austin)
4:45 Meeting Synthesis Plans for Proposal Advancement
5:30 Meeting Close

Appendix B. Participation

Name	Institution
Sajjad Abdullajintakam	Texas A&M University Corpus Christi
Katherine Allen	University of Maine
Maximiliano Amenabar	Montana State University
Jeanine Ash	University of California Los Angeles
Zachary Atlas	University of South Florida
Jamie Austin	Institute for Geophysics University of Texas at Austin
Keir Becker	University of Miami
Melissa Berke	University of Notre Dame
Elizabeth Ceperley	University of Wisconsin - Madison
Gail Christeson	Institute for Geophysics University of Texas at Austin
Jason Coenen	Northern Illinois University
Jeremy Deans	University of Southern Mississippi
Hang Deng	Colorado School of Mines
Justin Dodd	Northern Illinois University
Emily Racz Estes	Woods Hole Oceanographic Institute/MIT
Aida Farough	Kansas State University
Irina Filina	University of Nebraska - Lincoln
Heather Ford	University of Cambridge
Andy Fraass	Smithsonian Institution - National Museum of Natural History
James Gibson	Lamont-Doherty Earth Observatory
Sean Gulick	Institute for Geophysics University of Texas at Austin
Robert Hatfield	Oregon State University
Jennifer Hertzberg	University of Connecticut
Susan Humphris	Woods Hole Oceanographic Institute
Tom Janecek	National Science Foundation
Caitlin Keating-Bitoni	Smithsonian Institution - National Museum of Natural History
Scott Klasek	Oregon State University
Jessica M. Labonté	Texas A&M University Galveston
Chris Lowery	Institute for Geophysics University of Texas at Austin
Charlotte O'Brien	Yale University
Rosie Oakes	Pennsylvania State University
Molly Patterson	Binghamton University
Donald Penman	Yale University
Steve Philips	Institute for Geophysics University of Texas at Austin
Camilo Ponton	California Institute of Technology
Christina Ravelo	University of California Santa Cruz
Rachel Scudder	Texas A&M University
Timothy Shanahan	University of Texas at Austin
Elizabeth Sibert	Harvard University
Angela Slagle	Lamont-Doherty Earth Observatory, USSSP
John Swartz	Institute for Geophysics University of Texas at Austin
Teddy Them	Florida State University
Kaustubh Thirumalai	Institute for Geophysics University of Texas at Austin

Sonia Tikoo	Rutgers University
Elizabeth Trembath-Reichert	California Institute of Technology
Lael Vetter	University of Arizona
Amy Weislogel	West Virginia University
Yi Yang	University of Tennessee
Natalia Zakharova	Lamont-Doherty Earth Observatory
Lin Zhang	Texas A&M University Corpus Christi