**Second Draft Agenda**
U.S. Science Support Program – International Ocean Discovery Program Workshop

**Antarctica's Cenozoic ice and climate history:**
**New Science and new challenges of drilling in Antarctic waters.**

IODP, Texas A&M, College Station, 9-11 May 2016

**Monday 9 May, Morning** (Room 110/111, Koldus Building, Texas A&M)

8:00 – 8:45 Arrive; pick up badges; coffee.

8:45 Welcome and introductions; housekeeping.

9:00 Introduction to the workshop agenda and objectives (Trevor Williams)

**Proposed IODP Antarctic Drilling**

9:15 A short history of past Antarctic scientific drilling (Frank Rack)

9:30 Introduction to the IODP proposal system (David Mallinson)

9:45 Coffee break with fruit and pastries

10:15 *Presentations on Antarctic and Southern Ocean drilling proposals at JOIDES Resolution Facility Board*:

IODP-751. Ocean-ice sheet interactions and West Antarctic Ice Sheet vulnerability: clues from the Neogene and Quaternary record of the outer Ross Sea continental margin (Rob McKay et al.).

IODP-839. Development and sensitivity of the West Antarctic Ice Sheet tested from drill records of the Amundsen Sea Embayment (Karsten Gohl et al.).

IODP-732. Sediment drifts off the Antarctic Peninsula and West Antarctica (Jim Channell, Rob Larter, et al.).

IODP-567. Paleogene South Pacific APC Transect: Heat Transport and Water Column Structure During an Extreme Warm Climate (Debbie Thomas et al.).

11:30 *Updates on Antarctic and Southern Ocean drilling proposals*:

IODP-813-MSP. Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments (Trevor Williams, Carlota Escutia, et al.). Mission-Specific Platform expedition scheduled for Dec 2017 to Feb 2018.

IODP-848. Late Neogene to Quaternary ice-sheet and sea-level history of the Weddell Sea, Antarctica (Mike Weber et al.). At IODP Science Evaluation Panel (SEP).

IODP-847. Plio-Pleistocene reconstruction of ice-sheet, atmosphere, and ocean dynamics in Iceberg Alley (Mike Weber et al.) Resubmitted to SEP, 1 April 2016.

12:00 – 1:00 Lunch (multiple food options available in the nearby Memorial Student Center)

**Monday 9 May, Afternoon** (Room 110/111, Koldus Building, Texas A&M)

1:00 *Updates on Antarctic and Southern Ocean IODP drilling proposals (continued)*

IODP-812-MSP. Southeastern Ross Sea (Doug Wilson et al.);
IODP-868 Scotia Sea (Javier Hernandez Molina et al.);
Drake Passage (Frank Lamy, Gisela Winckler et al.);
Agulhas Plateau (Gabi Uenzelmann-Neben et al.);
IODP-MDP-863 ISOLAT.

**Geographic areas and time intervals of interest; toward an integrated overview of Antarctic ice in intervals of past high atmospheric $CO_2$ levels.**

2:00 Presentation: Ice sheet modeling (Rob DeConto)

2:15 Presentation: Sea level and Glacial Isostatic Adjustment (GIA) (Jacky Austermann)

2:30 Coffee Break

2:45 *Discussion: Where to drill – do we target the best geographic locations?* Are we targeting the geographic sectors where ice sheets are sensitive to climate change? Do we have a balance of drilling locations between deep water (continuous records) and close to the ice edge (a more direct record of ice advance and retreat)?

3:15 Presentation: Carbon dioxide, temperature, and ice volume over the Cenozoic (Amelia Shevenell)

3:30 *Discussion: Which ages, events, and high-$CO_2$ scenarios to target?* e.g. Late Eocene climate cooling, and ice extent and climate variability over the course of the Oligocene through to the Holocene. In particular: warm intervals and transitions that can serve as analogues for future warming (e.g. Oligocene, Mid-Miocene, Pliocene). Which intervals are currently not well characterized?

4:15 *Discussion: The place of Antarctic drilling in the IODP Science Plan and as policy-relevant science.*

- The fundamental links of Antarctic drilling to the IODP Science Plan and the Denver prioritization of the Science Plan challenges.
- Opportunities for linking the new results to current climate change questions. IPCC-level science and policy-relevant science.
- Summary, outlook, plan for workshop report.

5:00 Buses to the hotels and then from the hotels to evening reception.

**Monday 9 May, Evening** (Blackwater Draw, a microbrewery in Bryan)

~6:00 Catering by Papa Perez Mexican restaurant.

Buses back to hotels at ~9:00 and ~10:00.

**Tuesday 10 May, Morning** (Room 110/111, Koldus Building, Texas A&M)

**Drilling in a harsh polar environment: sea ice, icebergs and weather assessment; planning for the unexpected.**

8:00 – 8:45 Arrive; coffee.

8:45 Introduction to the ice and weather session (Trevor Williams)

9:00 Satellite imagery of ice conditions (Michael Cloutier, PGC)

9:15 Weather: forecasts of temperature, wind, and sea state; typical seasonal changes; available weather forecast and re-analysis products.

9:45 Coffee break with fruit and pastries.

10:15 *Discussion: How best to plan for ice and weather conditions?*
Including, for example:
- Direct experiences of attendees from high-latitude research cruises.
- The utility of icebreaker support.
- Sea bed drilling technology (MeBo, RD2).
- Characteristics of sea ice and storm (ship heave) conditions, monitoring, decision-making at sea;
- Role of Alternate sites and prioritization.

**Information about the examination of Antarctic sediment cores part of the workshop**

11:30 Introduction and organization (Denise Kulhanek and David Harwood)

12:00 – 1:00 Lunch (multiple food options available in nearby Memorial Student Center)

**Tuesday 10 May, Afternoon** (Koldus 110/111 and IODP / Gulf Core Repository)

1:00 – 2:00 Five-minute presentations about each of the sets of sediment cores to be shown:

Sediment cores similar to those anticipated from proposed expeditions:

- *Ross Sea, IODP-751*. Site 270 (Oligocene-Miocene Ross Sea shelf; examples of marine transgression, diamictite, shallow marine mudstone, glacial rythmites).
- *Amundsen Sea, 839*. Sites 1097 and 1103 (late Miocene-Pliocene Peninsula shelf; examples of diamictites, proglacial debris flows, and ice-distal muds).
- *Peninsula-Belingshausen, IODP-732*. Site 1096 and 1101 (Pleistocene Peninsula sediment drifts; including MIS interglacials 5, 9, and 31).
- *George V Land, IODP-813*. Site 1166 (Cretaceous-Eocene Prydz Bay shelf; examples of organic and mica-rich siltstone, and pre-glacial to glacial unconformity)

Sediment cores related to time intervals and environments of interest:

- Antarctic ice sheet evolution through time, Site 689 (Eocene to Pliocene at Maud Rise).
- Pliocene sedimentary cycles, Site U1361, Wilkes Land (diatom-rich and silty clay alternations, iceberg-rafted debris).

- Late-Pleistocene and Holocene Antarctic sediments, Sites 1098 and 1099, Palmer Deep (ice retreat, calving bay facies, laminations).
- Pliocene ice retreat in shelf sediments, Site 742, Prydz Bay (diatomite and diamictite).
- Mid-Miocene climate transition, Site U1356, Wilkes Land, and 1165, Prydz Bay (dropstones in silty clay).
- Micropaleontological examples from the IODP collection in the microscope room.

**2:00 – 3:00 Travel one mile from Koldus to IODP / Gulf Coast Core Repository by university bus (free) or on foot.**

**Examination of Antarctic sediment cores in the Gulf Coast Core Repository.**

3:00 Meet in IODP lobby: Welcome and orientation to the IODP and GCR.

The sediment cores will be organized into about twelve stations (core tables), each focusing on a different Antarctic location or time interval, each table holding up to eight 1.5 m core sections and a small microscope at some of them. There will be an additional station for micropaleontology. Groups of about seven people will move from station to station, spending 30 minutes at each one. Groups will contain a mix of experienced and junior scientists.

At each sediment core station, a map and seismic profile will provide the setting, and published data from the cores will be displayed on screen or on paper on the tables, to give examples of data such as ice-rafted debris (IRD) content, micropaleontology, opal content, physical properties, and other measurements.

**In parallel**: possible breakout groups to discuss matters arising from the first day and a half of the workshop; report writing.

3:00 Station 1

3:30 Station 2

4:00 Station 3

4:30 Station 4

5:15 First bus to hotels.

5:45 Second bus to hotels.

**Tuesday 10 May, Evening**

Free time - see logistics document for restaurant options!

**Wednesday 11 May** (IODP / Gulf Coast Repository)

**Examination of Antarctic sediment cores in the Gulf Core Repository (continued)**

**In parallel**: possible breakout groups to discuss matters arising from the first two days of the workshop; report writing.

8:15 – 9:00 Arrive; coffee.

9:00 Station 5

9:30 Station 6

10:00 Coffee break (and access to other core tables)

10:30 Station 7

11:00 Station 8

11:30 – 1:00 Lunch (Blue Baker pizza and salad, setup in lobby, eat in lobby or outside).

1:00 Station 9

1:30 Station 10

2:00 Coffee break (and access to other core tables)

2:30 Station 11

3:00 Station 12

3:30 **Workshop plenary session and wrap-up, IODP Room C126**

Reports and recap from the discussion sessions.

Plan for moving forward; plan for the workshop report for the JOIDES Resolution Facility Board.

5:00 Meeting close; first bus to hotels.

5:30 Second bus to hotels.

**Workshop participants:**

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| Gary Acton | Sam Houston University |
| John Anderson | Rice University |
| Jeanine Ash | UCLA |
| Jacqueline Austerman | Harvard University |
| Phil Bart | Louisiana State University |
| Sjoerd Berends | Siem Offshore |
| Rachel Bertram | Imperial College London, UK |
| Steve Bohaty | NOC, Southampton, UK |
| Imogen Browne | University South Florida |
| Jim Channell | University Florida |
| Brad Clement | Texas A&M University |
| Michael Cloutier | Polar Geospatial Center, Minneapolis |
| Jason Coenen | Northern Illinois University |
| Ellen Cowan | Appalachian State University |
| Rob DeConto | University of Massachusetts |
| Laura De Santis | OGS Trieste, Italy |
| Justin Dodd | Northern Illinois University |
| Eugene Domack | South Florida University |
| Carlota Escutia | Instituto Andaluz de Ciencias de la Tierra, Spain |
| Sarah Feakins | University of Southern California |
| Andrew Fraass | Smithsonian Institution |
| Karsten Gohl | AWI, Bremerhaven, Germany |
| Michelle Guitard | University of South Florida |
| Anna Ruth Halberstadt | Rice University |
| David Harwood | University of Nebraska, Lincoln |
| Daniel Hauptvogel | University of Houston |
| CD Hillenbrand | British Antarctic Survey, UK |
| Katharina Hochmuth | AWI, Bremerhaven, Germany |
| Minoru Ikehara | Kochi University, Japan |
| John Jaeger | University of Florida |
| Tom Janecek | NSF, Washington DC |
| Denise Kulhanek | Texas A&M University |
| Rob Larter | British Antarctic Survey, UK |
| Bridget Lee | University of California Riverside |
| Chris Lowery | University of Texas Institute for Geophysics |
| Melissa Luna | Wesleyan University |
| David Mallinson | East Carolina University |
| Mitch Malone | Texas A&M University |
| Ellen Martin | University of Florida |
| Yasmina Martos | British Antarctic Survey |
| Rob McKay | Victoria University of Wellington, New Zealand |
| David McInroy | ESO, Edinburgh, UK |
| Jennifer Middleton | Harvard University |
| Yuribia Munoz | University of Houston |
| Frank Nitsche | Lamont Doherty Earth Observatory |
| Suzanne O'Connell | Wesleyan University |
| Elisabetta Olivo | OGS Trieste, Italy |
| Sandra Passchier | Montclair State University |
| Molly Patterson | University of Massachusetts |

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|---|---|
| Stephen Pekar | Queens College CUNY |
| Michelle Penkrot | University of Florida |
| Frank Rack | University of Nebraska, Lincoln |
| Brendan Reilly | Oregon State University |
| Delaney Robinson | University of Houston |
| Alan Rooney | Harvard University |
| Yair Rosenthal | Rutgers University |
| Ari Salabarmada | Instituto Andaluz de Ciencias de la Tierra, Spain |
| Howie Scher | University of South Carolina |
| Reed Scherer | Northern Illinois University |
| Amelia Shevenell | South Florida University |
| Lauren Simkins | Rice University |
| Catherine Smith | University of South Florida |
| Joe Stoner | Oregon State University |
| Debbie Thomas | Texas A&M University |
| Ellen Thomas | Yale University |
| Gabi Uenzelmann-Neben | AWI, Bremerhaven, Germany |
| Kara Vadman | University of South Florida |
| Tina van de Flierdt | Imperial College London, UK |
| Jonathan Warnock | Indiana University of Pennsylvania |
| Sophie Warny | Louisiana State University |
| Mike Weber | University of Köln, Germany |
| Jo Whittaker | University of Tasmania, Australia |
| Trevor Williams | Texas A&M University |
| Gisela Winckler | Lamont Doherty Earth Observatory |
| Wenshen Xiao | Tongji University, China |
| Mingyu Yang | University of Nebraska, Lincoln |