

Workshop Proposal: IODP-751Full (Ross Sea) Proposal Revision Workshop: June 12-16, 2013, St. Petersburg, FL

Summary: We request \$5000 to support US participant travel and meeting costs for an IODP proposal writing workshop in St. Petersburg, Florida from June 12-16, 2013. During the workshop, a small international group of proponents will revise the IODP-751Full proposal to drill Neogene sequences on the shelf and slope of the Ross Sea, Antarctica, which has not been drilled since DSDP Leg 28 (1978). IODP-751Full focuses on understanding the evolution of the West Antarctic Ice Sheet and associated climate forcings and feedbacks across major Neogene climate transitions, including the Miocene Climatic Optimum (16.5-14.5 Ma), the middle Miocene Climate Transition (14.5-13.8 Ma), and the mid Pliocene warm period (~3 Ma). These science goals relate directly to Challenges 1 and 2 in the 2013-2023 IODP Science Plan and build on the regional successes of two NSF-funded ANDRILL programs. IODP-751Full has been in the IODP system since 2009 and reviewed favorably by PEP and SCP. However, the proposal needs substantial revision to reflect the current state of Antarctic margin drilling and the knowledge gained from ANDRILL and IODP Expedition 318 (Wilkes Land). In 2010, PEP informed the proponents that they have one final revision before the proposal is either sent for external review or deactivated. In 2013, PEP and NSF encouraged the proponents to resubmit by October 1, 2013 to take advantage of potential Southern Ocean drilling opportunities afforded by the proposed 2014-2017 *JOIDES Resolution* ship track. Since 2010, attempts to revise the proposal remotely have been incremental. The proponents feel that a small workshop is the best setting to make the appropriate revisions and to ready the proposal for submission to PEP in October 2013. The University of South Florida College of Marine Science has offered free meeting space for up to 15 proponents from June 12 to 16, 2013. All current and past proponents as well as scientists with complementary expertise, as recommended by PEP, have been encouraged to attend the workshop. Should the IODP-751 proposal be successful, the proponent group is committed to broadening participation to scientists not normally involved in Southern Ocean drilling, as well as to engaging new communities (e.g. the deep biosphere community). Matching funds for international participants travelling to the St. Petersburg workshop are provided by the SCAR-PAIS program (Carlotta Escutia, pers. comm., 2013).

1. Scientific Motivation and Goals: The marine-based West Antarctic Ice Sheet (WAIS) contains ~6-meters of sea-level equivalent (SLE) and much scientific interest is focused on how the WAIS might respond and/or contribute to ongoing and future climate change. Recent changes in the Southern Hemisphere westerly wind field, related to increasing atmospheric $p\text{CO}_2$, have enhanced upwelling of

relatively warm nutrient-rich Circumpolar Deep Water (CDW) south of the Polar Front, which has made its way onto Antarctica's over-deepened continental shelves and is contributing to basal melting and thinning of Antarctica's fringing ice shelves (e.g. De Santis, 1995, 1999; Pritchard et al., 2012). The collapse of marine based ice shelves and glacial systems may lead to increased discharge of fast flowing ice streams and outlet glaciers into the Southern Ocean.

Presently, much of the cold dense bottom water that fills the Earth's deep oceans is produced in large polynyas in the Ross and Weddell Seas, seaward of the largest fringing ice shelves of Antarctica. Thus, destabilization of the WAIS, with ongoing regional atmospheric and oceanic warming, may result in large melt water discharges to the Southern Ocean. Such discharges have the potential to disrupt global thermohaline circulation and increase global sea levels, with important implications for Earth's climate system (Gille, 2002; Jacobs et al., 2002; Shepard et al., 2004; Steig et al., 2009; Bromwich et al., 2012).

Much of what is known about the evolution of Antarctica's cryosphere [in the geologic past](#) is derived from ice-distal deep-sea sediment records. [Recent advances](#) in ocean drilling technology and climate [proxy methods](#) have made it possible to retrieve and interpret high-quality ice-proximal sedimentary sequences from Antarctica's margins and the Southern Ocean. These records contain a wealth of information about the individual histories of the East and West Antarctic Ice Sheets and associated temperature change in the circum-Antarctic seas that are only obtainable via geologic drilling. For example, studies of Antarctic drill [cores](#) from the Ross Sea (Naish et al., 2001; Naish et al., 2009) provide evidence of dynamic climate variability on both short and long timescales over the past 35 million years. [Integrated discoveries from newly recovered ice proximal records and distal deep-sea geochemical records \(e.g. Naish et al., 2009; Cramer et al., 2011; McKay et al., 2012\)](#) are [improving understanding of the mechanistic links between past Antarctic ice-volume fluctuations and oceanographic change necessary for understanding Earth's long-term climate evolution.](#)

Scientific ocean drilling of the eastern Ross Sea continental shelf and slope (IODP-751Full) represents a unique opportunity to generate a latitudinal and depth transect that will enable 1. A comprehensive Neogene reconstruction of WAIS dynamics and 2. Evaluation of the forcings and feedbacks involved in Earth's Neogene climate evolution. By tying the IODP-751 drilling targets to existing ANDRILL sites near Ross Island, we have a unique opportunity to reconstruct a complete inner shelf to slope transect in the Ross Sea; such a latitudinal and depth transect would be unique in the circum-Antarctic. The Ross

Sea has not been drilled since DSDP Leg 28 in 1975, and both drilling and analytical technology has improved substantially in the past 35 years. The proposed Ross Sea drilling relates directly to Challenges 1 and 2 in the 2013-2023 IODP Science Plan and builds on the successes of two NSF-funded ANDRILL programs.

The overarching goal of the proposed workshop is to revise the existing IODP-751 Full proposal for submission to PEP in October 2013. The proposal was reviewed favorably by PEP in December 2011, but proponents were 1. Encouraged to update the scientific objectives to reflect recent advances in Antarctic margin drilling (IODP Expedition 318 (Wilkes Land) and ANDRILL (Southern McMurdo Sound), 2. Asked to discuss the advances in drilling technology, chronostratigraphy, and paleoenvironmental proxies that had occurred since the Ross Sea was last drilled (1975) and 3. Informed that a single revision is allowed before PEP either sends the proposal for external review, or deactivates it. Based on current and expected proposal pressure, the JOIDES Resolution Facility Board (JRFB) expects the ship to remain in the eastern Indian Ocean and western to south western Pacific Ocean through 2017, followed by a likely track across the southern Pacific Ocean and into the south Atlantic. Thus, proponents have been encouraged to submit a revised proposal for IODP full-751 by October 2013, at the latest, for consideration by PEP.

2. Agenda: The goal of the proposed workshop is to prepare a revised (final) IODP proposal for drilling in the Ross Sea that PEP will (hopefully) send for external review by December 2013. The proponents have been told by both IODP and NSF that the resubmission timeframe is critical. After several attempts to revise the proposal remotely, the proponents decided that a proposal writing workshop is the most efficient way to revise the existing IODP-751 Full proposal to the high standard required to survive the external review process.

Example agenda:

Days 1-2 (June 12-13):

For the first 1.5 days, we will give presentations and engage in discussions on:

1) Existing seismic data and their interpretation, in order to confirm the selection of the proposed sites location and their potential for making scientific progress. Alternate sites are required and will be discussed.

2) Existing Ross Sea data: What we have learned from past Antarctic Margin Drilling (e.g. Ross Sea, Wilkes Land, ANDRILL)? What improvements have been

made in terms of drilling technology, chronostratigraphy, and paleoceanographic/paleoenvironmental proxies? What climate questions do we aim to answer by drilling the Ross Sea outer shelf and slope?

3) Antarctic Ice Sheet and climate modeling: How does modeling guide proposed drilling and what can proposed drilling provide ice sheet and global climate modelers? How can this new data be linked with/clarify ANDRILL-based model results?

4) Oceanography: Overview of the present regional physical oceanography. For example, what is the influence of CDW on regional ice stream grounding lines today (e.g. Totten, Pine Is.) and in the past (model results; Pollard et al., 2009)?

5) Drilling tool technology: What is the best recovery we can aim to achieve? When and how can we best use logging (new estimates of time needed for each site if logging is requested at each site)?

In the afternoon of June 13, the group will agree to a revised outline for the proposal and divide into expertise-based working groups to tackle revision of specific sections of the existing proposal. The group will also decide on the figures required for the revised proposal.

Days 3-4 (June 14-15):

Breakout writing sessions: Small groups will meet to write/revise their assigned sections. One or two participants will be asked to focus on figure preparation for the final document.

Day 5 (June 16):

In the morning, the small groups will reconvene to merge their sections into a final and coherent document. In the afternoon and evening, after the rest of the participants have left, De Santis, Shevenell, and McKay will integrate the revised sections into a full proposal. At the close of the meeting, the proposal should be ready for submission to PEP.

3. Workshop Education and Outreach: No specific outreach activities are planned during the workshop; however, several important educational opportunities exist. Two female USF College of Marine Science graduate students will be involved in the workshop, including 2012-2013 Schlanger Ocean Drilling Fellowship and 2013 NSF GRFP recipient, Tasha Snow, and Michelle Guitard, a LSAMP Bridge to the Doctorate/Sloan Foundation fellowship recipient. Snow and Guitard are working on high-latitude paleoceanographic research projects with IODP-751 Full proponent and PEP panelist, USF CMS Assistant Professor, Amelia Shevenell. Both will participate in a USAP cruise to the Totten

Glacier in East Antarctica in 2014 with Shevenell and new USF hire, Eugene Domack, which aims to understand the present and past influence of Circumpolar Deep Water (CDW) on a major East Antarctic outlet glacier system. By participating in the IODP workshop, Guitard and Snow will gain deeper understanding of the Ross Sea region, the challenges of drilling on Antarctica's continental margins, regional paleoenvironmental proxies, geophysics, ice sheet modeling, as well as the IODP proposal writing process. They will also network with the international group of scientists attending the workshop. Finally, the CMS graduate students will be asked to present a summary of their experiences and new knowledge during a USF graduate level course on Antarctic Marine Science that Shevenell will teach in Fall 2013.

4. Participants: The IODP-751 proposal has been in the IODP system since before 2009. During that time, a number of proponents cycled through the proposal writing process. In May 2013, Shevenell and De Santis put out a call to previous and new proponents (25; as suggested by PEP), including: geophysicists, ice sheet/climate modelers, physical oceanographers, sedimentologists/ stratigraphers, paleoceanographers, paleomagnetists, biostratigraphers, palynologists, biogeochemists, and logging scientists. Of those proponents, 8 have accepted our invitation and 3 are considering attending, but are short on travel funds. Scientists from four IODP countries are scheduled to attend, including 6 (+3?) Americans. Currently, there are 4 women, 1 minority, and 4 early career scientists planning to attend. The workshop is, in principle, open to all interested parties. However, because the goal of the workshop is to emerge with a final proposal draft for submission to PEP in October 2013, we prefer to limit the number of workshop participants to <15.

5. Travel and Location: The proposed workshop is scheduled from June 12-16, 2013 at the University of South Florida's College of Marine Science. Conveners chose this location because it was central for most US participants (from LA, NC, FL, and possibly MA, NY) and flights to TPA and accommodations in the St. Petersburg are cheap in June, compared with the rest of the US. USF CMS has reserved a block of rooms at the St Petersburg Hilton, which is within walking distance of CMS and downtown St. Petersburg, for a corporate discount rate of \$116 (single/double) to \$134 (suite) per night. A SuperShuttle from/to TPA is available for \$60/person round trip. If participants can coordinate their arrival schedules, it may be more economical for one or two participants to hire a rental car for the duration of the meeting. Finally, the USF College of Marine Science will provide a meeting facility with a teleconferencing connection, wireless internet access, and projector free of charge. This space is limited to 15 people. A larger room is available, but a usage fee is charged for that space.

6. Advertising: No advertising is requested due to the limited size and nature of the proposed workshop. Past and new proponents have been contacted directly via email.

7. Budget Summary and Justification: We request \$5000 to cover travel expenses for US participants (\$4500) and meeting supplies (\$500; e.g. conference call connection for additional US participants unable to attend, morning coffee and refreshments). At the time of our request, there are three confirmed US participants who are flying into TPA (and 3 unconfirmed participants who would also be flying), two US participants who are driving from Tallahassee, FL, and one US participant does not require travel funds (Shevenell).

Budget Justification for \$5000:

1. Hotel costs for all participants: \$116/night (5 nights): \$580 + Tax (\$2400 (6 confirmed participants; 1 room share))
2. Airfare for 3-6 participants: \$1825
3. Travel costs for two participants driving from Tallahassee, FL: \$167.25 (\$0.565/mile*296 miles)
4. Airport Shuttle for participants: \$60/person, return (3-6 people; \$120-240)
5. Meeting Supplies: \$500 (coffee breaks)