IODP Proposal Cover Sheet

Antarctic Cenozoic Paleoclimate

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Title	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
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Abstract

Along the George V and Adélie Land (GVAL) shelf of Antarctica, shallowly-buried strata contain a record of Antarctica's climate and ice history from the lush forests of the Eocene greenhouse to the dynamic ice sheet margins of the Neogene. Over these times, Antarctica and the Southern Ocean have played a central role in controlling sea level, deep-water formation, ocean circulation, and exchange of carbon dioxide with the atmosphere. Yet currently there are very few direct records of Antarctic climate and ice conditions from close to the continent. On the GVAL shelf, short piston cores and dredges have recovered Cretaceous and Eocene sediment at the seabed. In 2010, IODP Expedition 318 recovered earliest Oligocene and early Pliocene subglacial and proglacial diamicts, providing direct records of ice advances across the shelf at these times, and confirming that target sediments are accessible at shallow burial depths. However, challenging ice and drilling conditions from the JOIDES Resolution resulted in poor core recovery and abandoning sites before the stratigraphic targets were reached. Here we propose to use the MeBo sea bed drill for improved core recovery and easier access to the shelf. We propose to drill a primary stratigraphic transect of shallow (~80m) holes to investigate Antarctica's role in Eocene greenhouse climates and the climate cooling that followed. An alternate transect covers icehouse climates and ice conditions.

In the Cretaceous and Eocene greenhouse target intervals: temperature and vegetation records will provide high-latitude constraints on pole-equator temperature gradients and their evolution; the proximity of the sites to the coastal lowlands will enable us to assess the hypothesized role of thawing permafrost in Eocene hyperthermal events; and late Eocene cooling and possible pre-cursor glaciations can also be documented by drilling.

To investigate Oligocene to Pliocene ice sheet dynamics, we target strata above and below regional erosional and downlap surfaces to date and characterize major episodes of ice sheet advance and retreat. These direct records of ice extent on the shelf can be set in the context of Southern Ocean records to relate ice behavior to paleoclimate conditions. The ice and climate history of the GVAL margin can provide warm-world scenarios to help understand ice sheet instability in analogous future warm climates.

This proposal addresses the IODP science plan's challenges "How does Earth's climate respond to increased CO2?"and "How do ice sheets and sea level respond to a warming climate?"

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Scientific Objectives

Paleoclimate and ice sheet dynamics objectives:
- The timing and environmental conditions leading to major ice advances over the shelf, and how this relates to records of IRD, sea level and oxygen isotopes. We aim to sample the Eocene/Oligocene ice advance (~34 Ma), Oligocene environmental conditions, and in alternate sites, the mid-Miocene climate transition (~14 Ma), and earliest Pliocene warmth and climate fluctuations (~5 Ma).
- Climate cooling in the late Eocene in advance of main glacial inception at the Eocene/Oligocene boundary: what were the paleoenvironmental conditions, was there cyclicity, and were there precursor glaciations?
- Antarctica's climate during the early Eocene climatic optimum, including cyclicity, hyperthermals, temperatures and vegetation. This will extend the short time window obtained at distal Site U1356 (Expedition 318), at a site closer to Antarctica.

- Early Cretaceous greenhouse conditions (non-marine sediments): are they stable or cyclic, and how do conditions compare to the Eocene greenhouse?

Drilling will also address seismic-stratigraphic, glacial-isostatic, and tectonic objectives to:
- Date the major changes in shelf prograded wedge geometry and the major unconformities.
- Constrain the timing and character of rifting between the GVAL margin and Australia.
- Assess whether the predictions of glacial isostatic adjustment (GIA) models are recorded in the ice-proximal sediments (e.g., relative sea level rise adjacent to expanding ice sheets).

Non-standard measurements technology needed to achieve the proposed scientific objectives.

Drilling from a stable platform achieves much better recovery of glacial sediments than from a moving ship (e.g. ~98% recovery at AND-1B, drilled from the McMurdo ice shelf, compared to ~38% recovery of semi-lithified diamict at Antarctic shelf sites drilled from the JOIDES Resolution). Therefore we propose to use a sea floor drill rig (MARUM's MeBo) to provide a stable platform and improved core recovery. Additionally, the deploying vessel would be better able than the JOIDES Resolution to reach sites through moderate sea ice conditions.

Proposed Sites

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
GVAL-01B	-66.75330, 145.57758	511	80	0	80	Late Eocene cooling, precursor interglacials? Youngest available strata along NBP-1402-2. Primary site.
GVAL-48A	-66.76673, 145.55076	539	80	0	80	Late Eocene cooling, precursor interglacials? Youngest available strata along NBP-1402-2. Primary site.
GVAL-02B	-66.79061, 145.50154	570	80	0	80	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
GVAL-50A	-66.84020, 145.40150	635	80	0	80	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere

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-	-	-	-	-	-	is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
GVAL-49A	-66.81298, 145.45648	598	80	0	80	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
GVAL-03B	-66.87225, 145.33555	711	80	0	80	Middle/Late Eocene climate conditions, nature of paleoenvironmental change represented by underlying high-amplitude reflector. Primary site. In alternate seismic interpretation, this site could be early Oligocene in age and contain glacial sediments.
GVAL-51A	-66.87877, 145.32210	737	80	0	80	Middle/Late Eocene climate conditions, nature of paleoenvironmental change represented by underlying high-amplitude reflector. Primary site. In alternate seismic interpretation, this site could be late Eocene and earliest Oligocene in age and contain glacial sediments.
GVAL-04B	-66.88992, 145.29893	765	80	0	80	Middle Eocene climate conditions, nature of paleoenvironmental change represented by overlying high-amplitude reflector. Primary Site. In our alternate seismic interpretation, this site could be late Eocene in age.
GVAL-52A	-66.88164, 145.31657	742	80	0	80	Middle Eocene climate conditions, nature of paleoenvironmental change represented by overlying high-amplitude reflector. Primary Site. In our alternate seismic interpretation, this site could be latest Eocene in age.
GVAL-05B	-66.90775, 145.26198	836	80	0	80	Middle Eocene climate and environmental conditions, nature of paleoenvironmental change (close to Dredge 1). This site could be late Eocene in our alternate interpretation of the seismic profiles. Primary Site.
GVAL-53A	-66.89937, 145.27999	805	80	0	80	Middle Eocene climate and environmental conditions, nature of paleoenvironmental change (close to Dredge 1). This site could be late Eocene in our alternate interpretation of the seismic profiles. Primary Site.
GVAL-06B	-66.91747, 145.24298	870	80	0	80	Middle or Late Eocene climate and environmental conditions, nature of paleoenvironmental change (close to

-	-	-	-	-	-	Dredge 1). Primary Site.
GVAL-07B	-66.93991, 145.19657	961	80	0	80	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
GVAL-54A	-66.94599, 145.18432	996	80	0	80	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
GVAL-08B	-66.94996, 145.17540	1037	80	0	80	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
GVAL-55A	-66.95434, 145.16618	1067	80	0	80	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.

813-Add

Addendum to IODP-MSP proposal 813-Full (Antarctic Paleoclimate):

Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments

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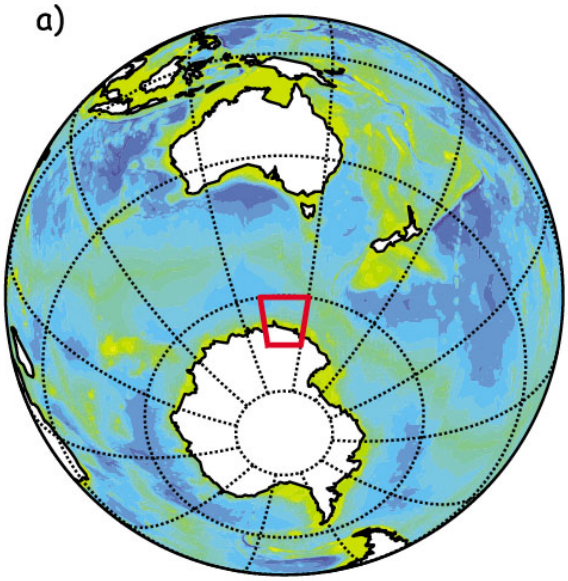

Contents

Abstract

This Addendum, 813-Add, follows recommendations by the ECORD Facility Board. Of the two transects of primary drill sites in 813-Full, here we prioritize the "greenhouse" transect that addresses principally Eocene pre-glacial and warm-climate objectives over the "icehouse" transect that addresses principally Oligocene to Pliocene objectives. This focus will allow adequate time to complete the greenhouse transect, including double holes at some sites. In February 2014, Expedition NBP-1402 of the *N.B. Palmer* took a seismic profile along the greenhouse transect. The thickness of the late glacial diamicton (till) cover is more clearly observed this seismic profile, compared to the older profile. Here we present new and updated site locations, based on the new data.

1. Introduction

This Addendum was requested by the ECORD Facility Board following their March 2014 meeting. The board asked the proponents to address two points:

The first point was that it is optimistic to plan to drill 18 primary sites during the expedition. The board also asked us to consider multiple holes at some sites. Therefore the board recommended that only one of the two main transects should be chosen for primary sites. Given the higher ice risk for the western ('icehouse') transect, the board recommended that the proposal focuses on the eastern ('greenhouse') transect.

The second point concerned the estimated thickness of the postglacial cover that has to be penetrated before drilling into Cretaceous to Pliocene sequences, which are the main objective of the proposal. If the cover is too thick, the target strata will be difficult to reach.

Since the 813-Full proposal was submitted in April 2013, progress has been made on two fronts, which address the board's questions: 1. Development of the operation plan in terms of time estimates, prioritization of sites, and available sea bed drill rigs; and 2. Acquisition of new seismic survey data in the area of the Mertz Glacier, covering the proposed "greenhouse" primary transect of sites.

2. Drilling operations plan.

2.1 Sea floor drill rig

In Proposal 813-Full, we presented the case for using the MARUM-MeBo sea bed drill rig. We favored this rig because it can drill to 80 m and it has been in operation since 2005, so its capabilities are well known. Also, it will be deployed in Antarctic waters in the Amundsen Sea in early 2015, which will be a valuable model expedition for IODP-813. However, MeBo's schedule is full for the next three years. Therefore, the British Geological Survey's Rock Drill 2 (RD2) sea bed drill rig becomes an option. By early 2017, the latest iteration of RD2 will have

been deployed on three cruises, which will give good confidence about its capabilities. It can drill 50 m of core, which is not as deep as the 80 m the proponents planned in 813-Full, but nevertheless would reach the target strata and provide good continuous stratigraphic sequences to fulfill the expedition objectives. The MARUM-MeBo remains our preferred sea bed drill rig, but the RD2 is also a viable option.

2.2 Operation time estimates

In Proposal 813-Full, we estimated that each hole would take 2 days to drill, and that 12 hours turn-around time would be required between MeBo sea bed drill rig deployments to offload the cores, perform routine checks and maintenance, and prepare the rig for the next deployment. The distances between sites within the two transects are short, so we assumed that the ship could move to a new site while the rig was being turned around for the next deployment. The estimate of 2 days coring per hole was based on the fact that over several previous expeditions, the MeBo has not needed to be deployed for longer than about 2 days. We did not expect to be able to reach 80 m at every site. Assuming 45 days of operational time and 2.5 days per hole, 18 sites were assigned as primary sites.

However, this estimate was undoubtedly optimistic, because some time-costs were not included in the plan. We recognized that sea ice (Fig. 1), icebergs, and weather-related difficulties were likely to take up some unknown amount of time, but because this lost operation time could be highly variable (based on previous ODP/IODP Antarctic drilling experience), we did not include it in the time estimate. Such contingency time is not usually included in IODP operations plans. Also, the sea bed drill rig would probably need an average turn-around time longer than 12 hours to account for extended checks and maintenance, because neither MeBo nor RD2 have drilled so many holes in this relatively short amount of time. Therefore, we are in agreement with the ECORD Facility Board that we should re-prioritize primary sites.

The drilling rate in the target sediments is difficult to predict accurately, but can be estimated from the drilling rate in similar sediments in the ANDRILL AND-1B borehole in the McMurdo Ice Shelf area of the Ross Sea. There, a 460-m-section of the hole, composed of diamict, diatomite, mudstone and sandstone was drilled with HQ-size bit and drill rods, similar to those used by both the MeBo and RD2 drill rigs. This section in AND-1B took 10 days to complete, giving an average drilling rate of about 46 m per day. Core recovery was about 99%.

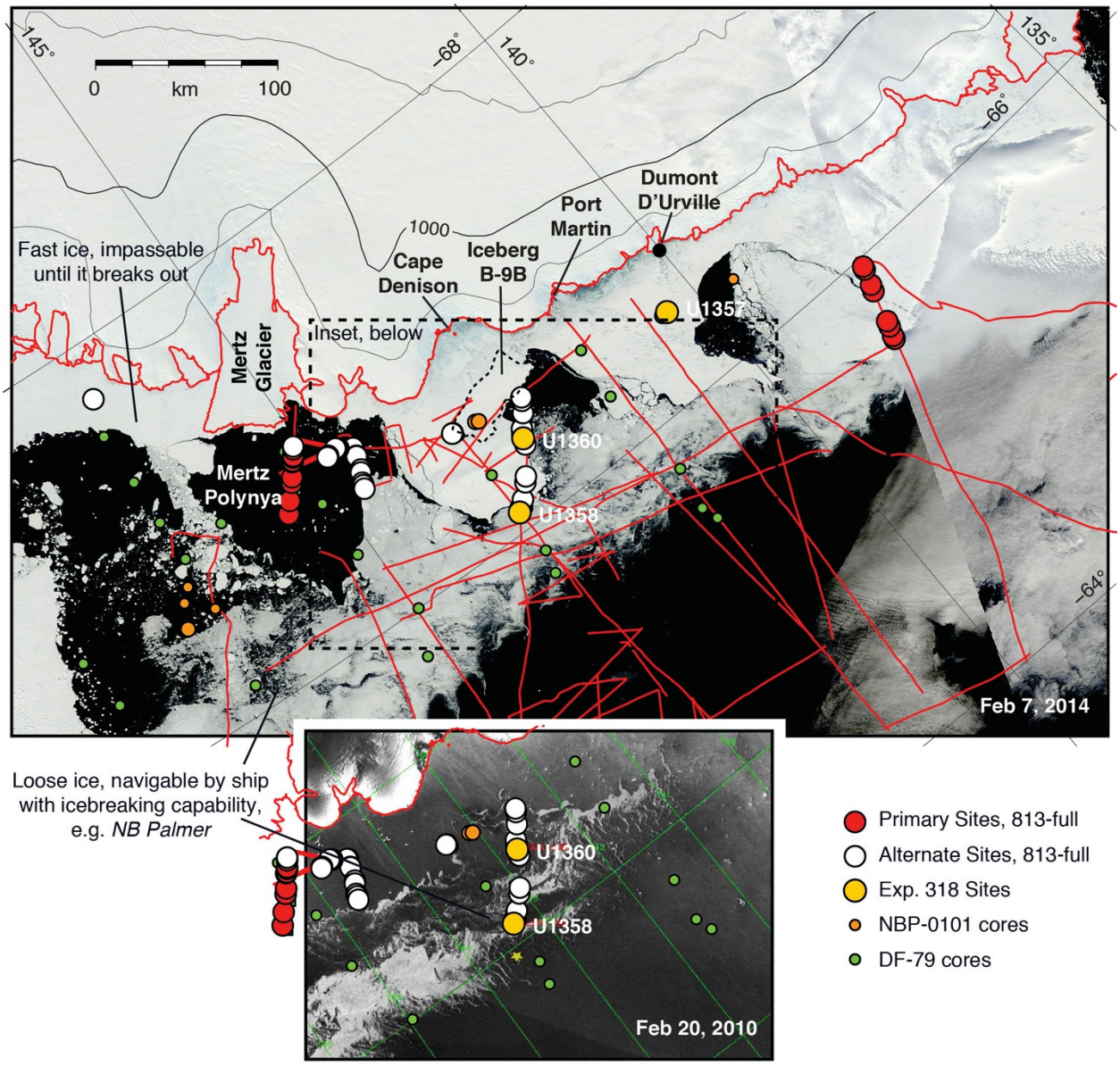

Figure 1. Satellite images of sea ice in the area of the Proposal 813-Full sites on February 7 2014 (just after the *N.B. Palmer* had conducted the seismic survey over proposed site locations in the Mertz Polynya) and February 20 2010 (during IODP Expedition 318 of the *JOIDES Resolution*). Daily sea ice imagery is available from NASA's Terra and Aqua satellites: http://lance-modis.eosdis.nasa.gov/imagery/subsets/?project=antarctica&subset=MertzGlacier Inset image via TeraScan, provided by *RV Astrolabe* during Exp. 318.

Drilling rates have also been independently estimated for MeBo. For the early 2015 MeBo drilling in the Amundsen Sea, the operations plan includes 12-14 holes of perhaps 35 to 50 m penetration in 25 operational days. For RD2, ECORD-ESO has advised us to estimate 36-48 hours per hole, depending on various factors including rock hardness. These time estimates for drilling are similar to our original per-hole time estimate.

The main uncertainty in operations planning is in delays due to sea ice cover and weather events,

which can cause fairly significant loss of operational time. For planning purposes here, we use a contingency time of 20% loss of operational days, based previous experience on the George V Land shelf. During IODP Expedition 318, 4.6 days were lost to weather, in addition to extra underway time spent finding an ice-free path to drill sites. During the WEGA seismic survey cruise in 2000, about 20% of the operations time was lost.

The total duration of the cruise is uncertain, and will be determined by vessel availability, among other factors. We assumed a cruise of 60 days in 813-Full, in common with typical JOIDES Resolution cruise durations. Practical limitations include the weather and ice window when the sites are accessible, and the endurance of the vessel (fuel capacity, etc). New operational time estimates are presented in Table 1: if 20% contingency time is included, between 8 and 18 holes can be drilled during the expedition. The change in drilling plan from 80 m holes to 50 m holes allows the high estimate of possible number of holes to remain at 18. The mid-point between the high and low estimates suggests that 13 holes is a practical number to expect from the expedition. The objectives of the greenhouse transect of sites can be met with this number of holes.

Table 1. Operational Time estimates for IODP-813, Antarctic Paleoclimate. High and low estimates are given to provide a range of possible scenarios.

	High estimate	Low estimate	
Total cruise duration	60	50	days
In-port days	3	4	days
At-sea days	57	46	days
Transit, Hobart to George V Land and back	11	8	knots
2 x 2700 km, 1457 nm	11.0	15.2	days
Transit between transects			
400 km, 216 nm	0.8	1.1	days
Operation days available	45.1	29.7	days
For coring each hole to up to 50 m, including one logging run	1.5	2.0	days
For each rig turnaround, including transit to next site	0.5	1.0	days
Number of holes to be drilled	**22**	**10**	holes
Days coring @ 2 or 3 days per hole	44	30	days
Number of holes to be drilled, including contingency time (if 20% of the operation time is lost to ice or weather)	**18**	**8**	holes

2.2 Prioritization of drill sites

The ECORD Facility Board recommended that we focus on the "greenhouse" (eastern) transect, along line WEGA-0201 rather than the "icehouse" (western) transect. We agree to this new focus. The greenhouse transect of drill sites lies in the Mertz Polynya, which is a persistent area of open-water in January and February because katabatic winds are channeled down the valley of

the Mertz Glacier and push the sea ice away from the coast. The *N.B. Palmer* entered the Mertz Polynya during the 2014 season, even though it was a very heavy sea ice year, and was able to access all of the site locations in that area (see Fig. 1). However, based on satellite images of sea ice cover, the icehouse transect was inaccessible during 2014. This illustrates the utility of having a large number of alternate sites and a flexible operation plan for Antarctic drilling expeditions.

2.3 Double coring some sites

In Proposal 813-Full, a single hole was planned for all sites, because we prioritized maximum overall stratigraphic coverage over more complete recovery of fewer sites, as would be the case for double-coring. In the case of most of the sites, the age of the sediments is only approximately known, and this scenario, single-hole sites is a valid approach. However, more complete coverage at each site is also desirable because a more continuous stratigraphic interval, without gaps, is better for lithostratigraphy, magnetostratigraphy, and studies of cyclicity. Therefore, at sites with a target horizon (for example, the Eocene-Oligocene boundary or unconformity), or a target age (for example, the Early Eocene climate optimum), two or possibly three holes should be drilled at these sites.

The core recovery in the first hole is also important for making the decision whether to drill a second at that site. If the stratigraphy is very well recovered, small stratigraphic gaps can be filled using downhole log data. If the recovery is quite poor, a second hole is unlikely to yield full stratigraphic coverage. These factors must be balanced with the scientific value of the site. The main reason for using a sea bed drill rig is to increase recovery compared to JOIDES Resolution drilling, and we anticipate that core recovery will be good. Indeed, it is possible that rates similar to those achieved by the ANDRILL drill rig can be achieved, given the similar drilling systems.

The new NBP-1402 seismic profiles have sufficient vertical resolution to allow us to locate sites to penetrate through target reflectors within 50 m (Figures 2-6). Previously, the wavelength of the WEGA seismic traces was too long to be sure about where the reflectors intersect the sea bed, so in 813-Full, pairs of sites were located stratigraphically above and below target reflectors, in order to capture any change in environment across the lithological boundary responsible for the reflection. Instead, now we plan to double core across such target reflectors.

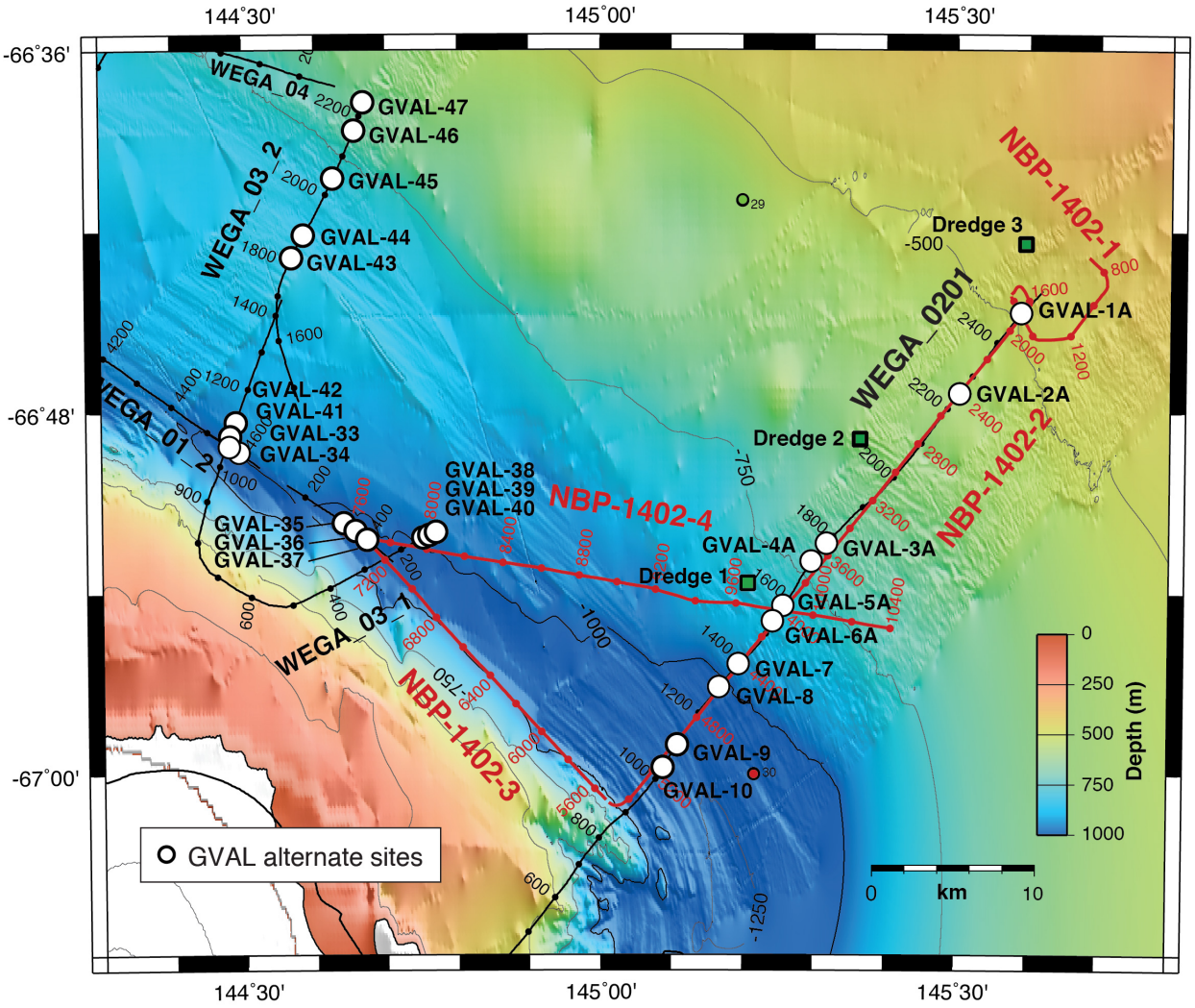

Figure 2. Location map of seismic lines covering the original Eocene to Cretaceous ("greenhouse") sites from proposal 813-Full (See Fig. 3 for the new 813-Add sites). The track of the *N.B. Palmer* NBP-1402 seismic lines are highlighted in red. The existing WEGA seismic lines are in black. Bathymetry is from the "GVdem" compilation by Beaman et al., 2011; the grid spans an area 138-148°E, 63-69°S, with a cell pixel size of 0.001-arcdegree (c. 100m).

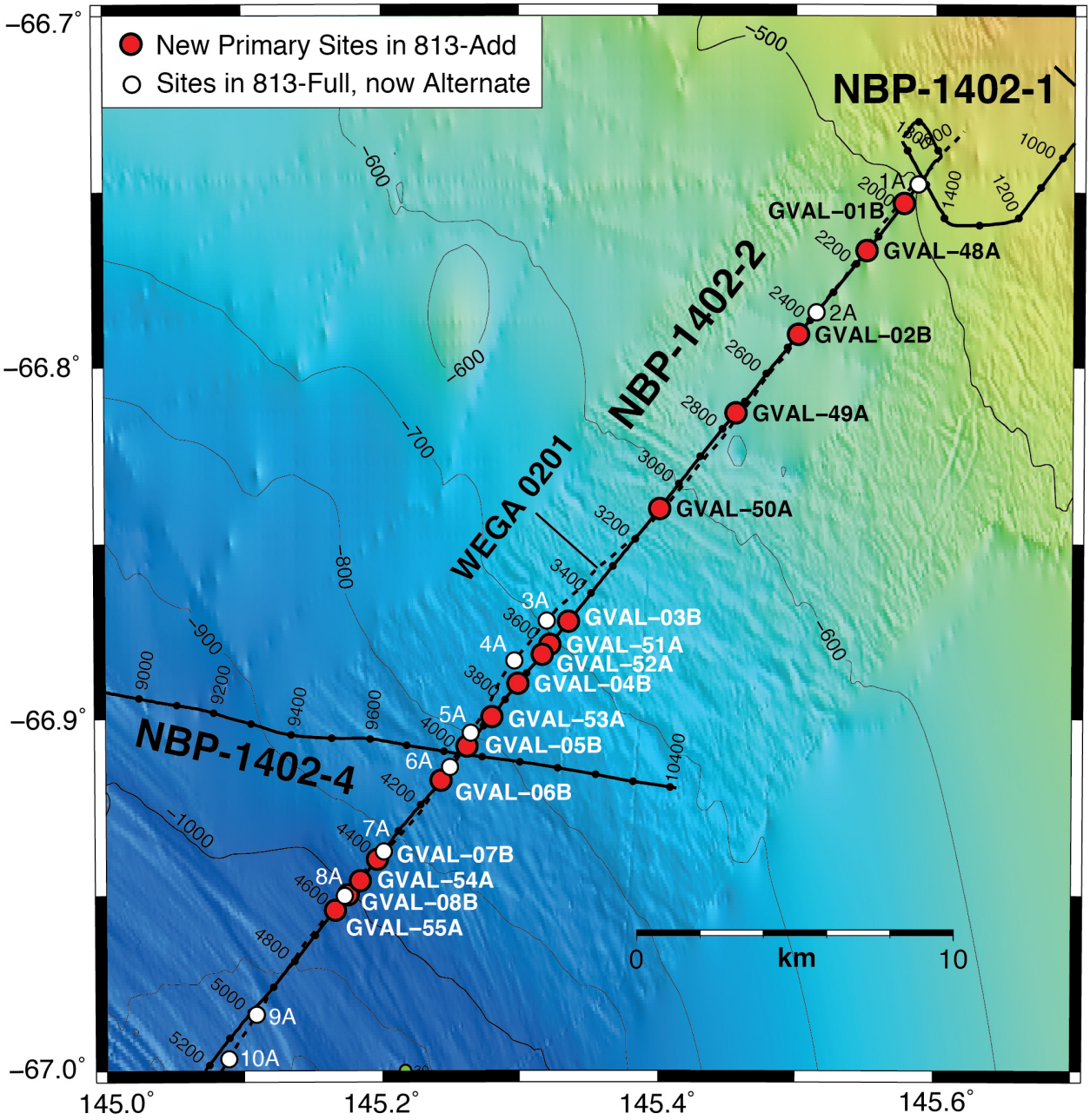

Figure 3. Location map of new site locations in 813-Add. These sites were chosen because of their relatively thin till cover and the presence of target seismic reflectors. The track and shotpoints of *N.B. Palmer* NBP-1402 seismic line are marked. Bathymetry is from the "GVdem" compilation by Beaman et al., 2011; the grid spans an area 138-148°E, 63-69°S, with a cell pixel size of 0.001-arcdegree (c. 100m).

2.4 Revised Drilling Plan

In 813-Add, we propose a primary transect of sites along the overlying seismic lines WEGA-0201 and NBP-1402-2 (Figure 2), with sites stepping up the gently dipping stratigraphic section (Figure 6). This will cover mainly greenhouse objectives, but it is possible that the transect includes the Eocene/Oligocene transition and Oligocene strata. At each site, one or two holes will be drilled to 50 m depth. We target sites with thin late glacial diamicton, based on the seismic profiles, reprocessed to better define the reflectors just under the sea bed. If a critical section, for example a boundary such as the Eocene/Oligocene transition or one of the Eocene hyperthermals, is recovered, we will drill a second hole and perhaps a third hole at that site.

The plan for site priority within the greenhouse transect is the following. First, either GVAL-51A or 52A would be drilled to test a new hypothesis that the bright reflector to be drilled at these sites represents a glacial advance, possibly the Eocene-Oligocene transition. The next two drill would be at the far ends of the transect (GVAL-01B and GVAL-55A) so that strata representing the youngest and oldest parts of the stratigraphy can be constrained. For example, the youngest strata could be glacial or pre-glacial, and this should be clear from the lithology. Subsequent site priority would follow from the information gained from the first sites. Initial dating would be by biostratigraphy, particularly dinocyst biostratigraphy. EPSP have granted permission to drill sites within a 100-m-wide ribbon along the seismic line WEGA-0201 where sites are located (and similarly for other sites and seismic lines in 813-Full). This provides extra flexibility to drill at sites where the cover is thinnest and the sea floor is free from steep slopes and any loose surface rocks.

A secondary transect of alternate sites would cover icehouse objectives along Line IFP-103 or IFP-107, and Cretaceous objectives along WEGA seismic lines. These and other alternate sites would be drilled if the primary transect was inaccessible, or was drilled faster than expected.

The 50 m holes planned here are not deep by IODP standards, but the recovered sections will be long enough to sample the full range of lithologies at a site, give the stratigraphic context, capture cyclicity in climate and environment, and provide a window into the ancient conditions on Antarctica. On the George V and Adélie Land shelf, post-rift sediments have a total thickness of about ~2700 m, and our drilling strategy will sample this sequence in age windows.

Valuable sediment records will be obtained even if 50 m penetration is not fully achieved, and we do not expect to reach 50 m at all of the proposed sites. In particular, the Eocene and Cretaceous target ages have been only rarely sampled in Antarctica, and often not with the stratigraphic context that we aim for in this proposal, so any stratigraphic records will be new and noteworthy, even if they are relatively short.

3. Imaging the thickness of the late glacial diamicton

3.1 New site survey data from N.B. Palmer Expedition NBP-1402, February 2014

The principal aim of *N.B. Palmer* expedition NBP-1402 was to survey the Antarctic shelf in the area of the Totten Glacier and Sabrina coast, several days sailing east of the George V Shelf area. The expedition, led by Amy Leventer of Colgate University, also spent about three days off George V Land to take seismic surveys, swath bathymetry, and CTD profiles in the area of the proposed IODP-813 sites.

The seismic survey on NBP-1402 was led by Sean Gulick and Steffen Saustrup of the University of Texas. Four lines of high-resolution multichannel seismic data were shot using two 45 in^3 GI seismic sound sources and recorded by a 100-m-long, 24-channel streamer (Figures 3-6). The source was fired every 5 s, for a nominal shot spacing of 12.5 m. Source frequency content was approximately 20-300 Hz, with maximum power at 100-160 Hz.

The NBP-1402 surveys cover the main transect of Eocene sites (Sites GVAL 1 to 10), repeating at higher resolution the previous seismic profile WEGA-0201 (Figures 2, 4, 5). The new survey also provides two cross lines and links to the rest of the WEGA network to the east (previously, line WEGA-0201 was isolated from the rest of the network and had no crossing lines).

Additionally, dredge samples were obtained in the range of shotpoints 3500-3750, and around shotpoint 2900. Clasts from these dredges are being analyzed by Francesca Sangiorgi at Utrecht University for dinocyst biostratigraphy. Swath bathymetry was also obtained over this transect and elsewhere in the Mertz Polynya.

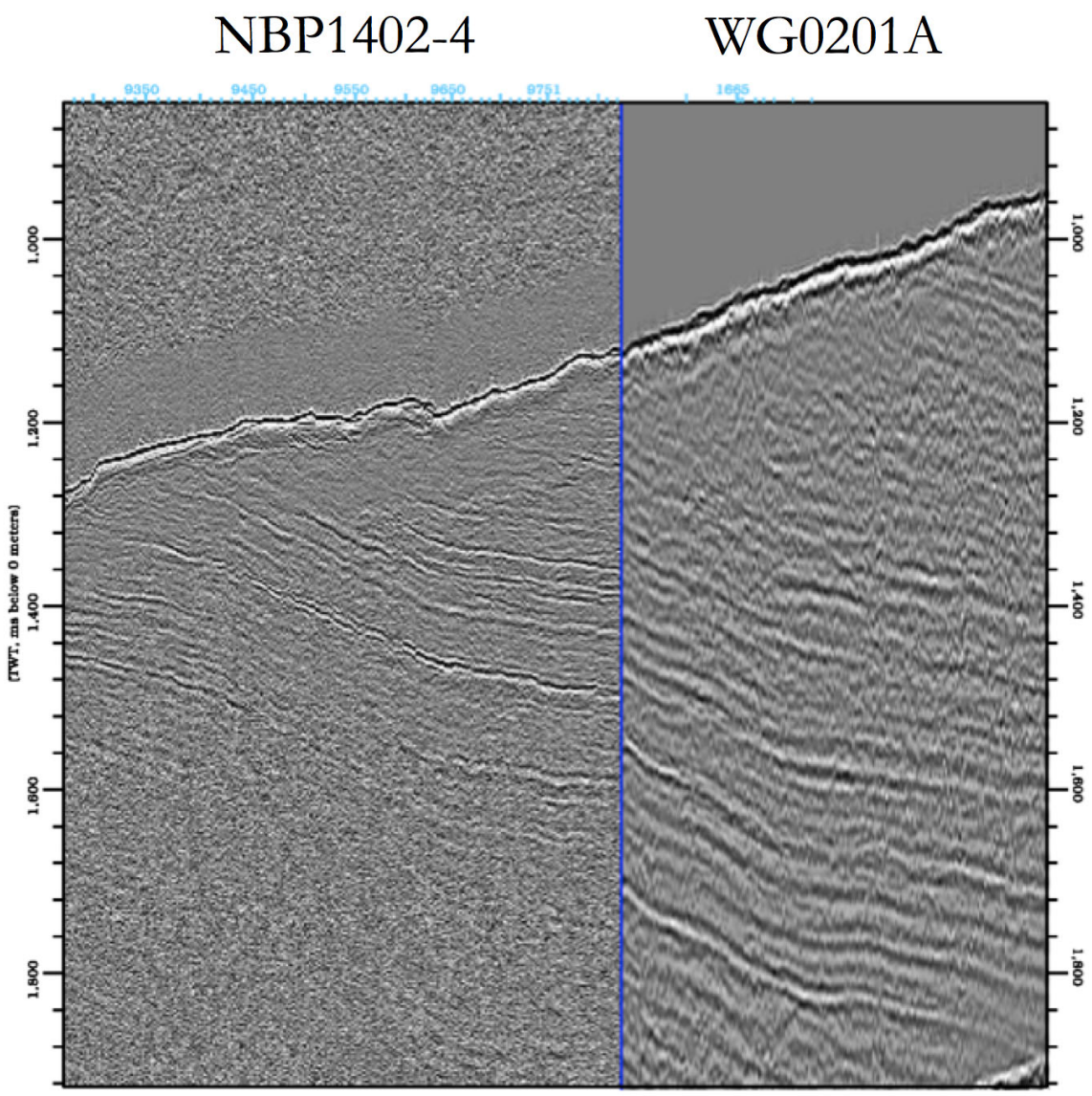

Figure 4. Comparison of seismic data at the intersection of lines NBP1402-4 (2014) and WEGA-0201 (2000) (Figure 2). This new *N.B. Palmer* seismic data enables us to refine the proposed site locations. A 50 m hole would extend 0.05 to 0.06 seconds TWT below the sea bed, depending on the sediment velocity.

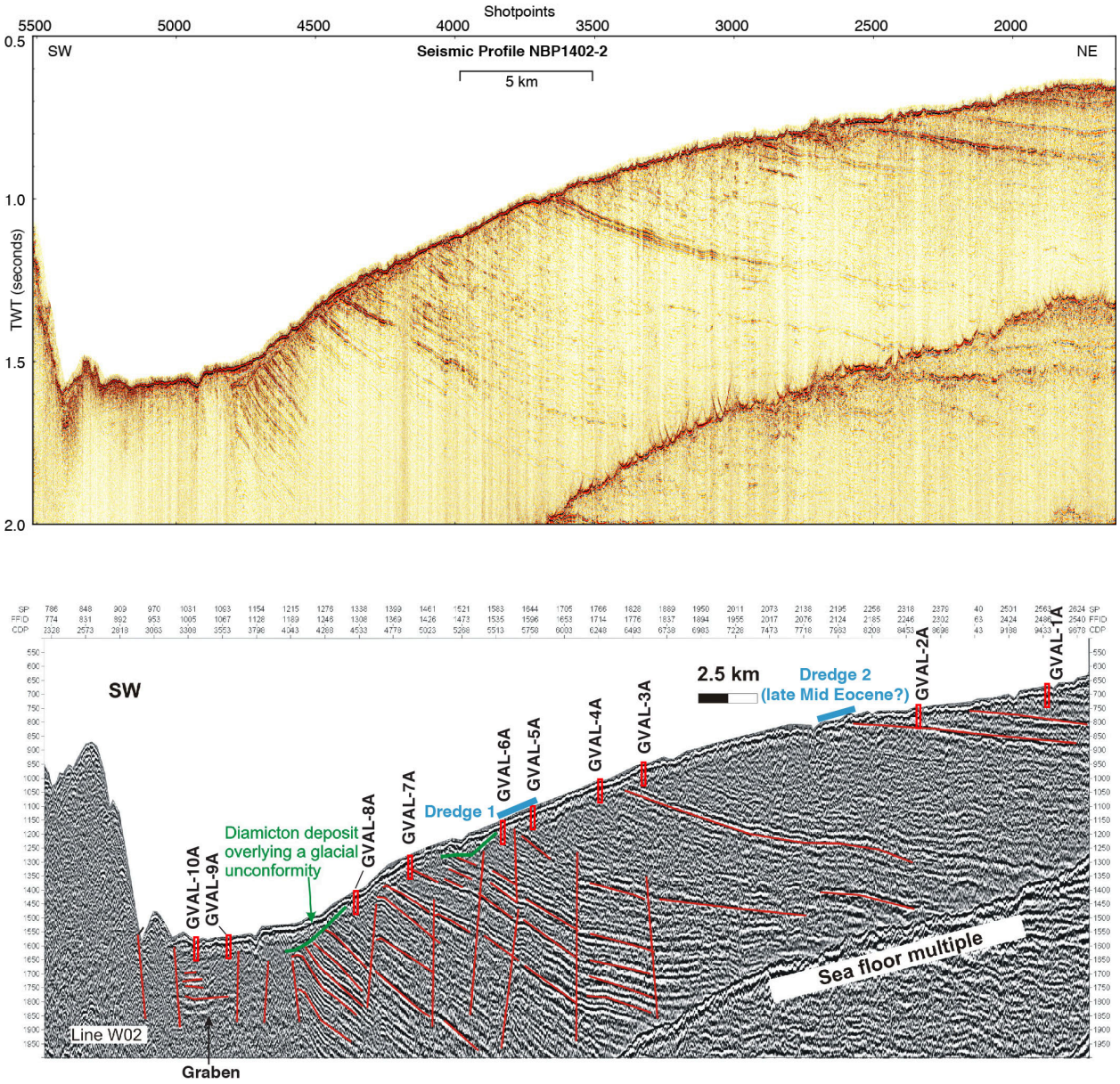

Figure 5. Upper panel: Seismic profile NBP-1402-2. Lower panel: Seismic profile WEGA-0201, with the original 813-Full drill sites marked.

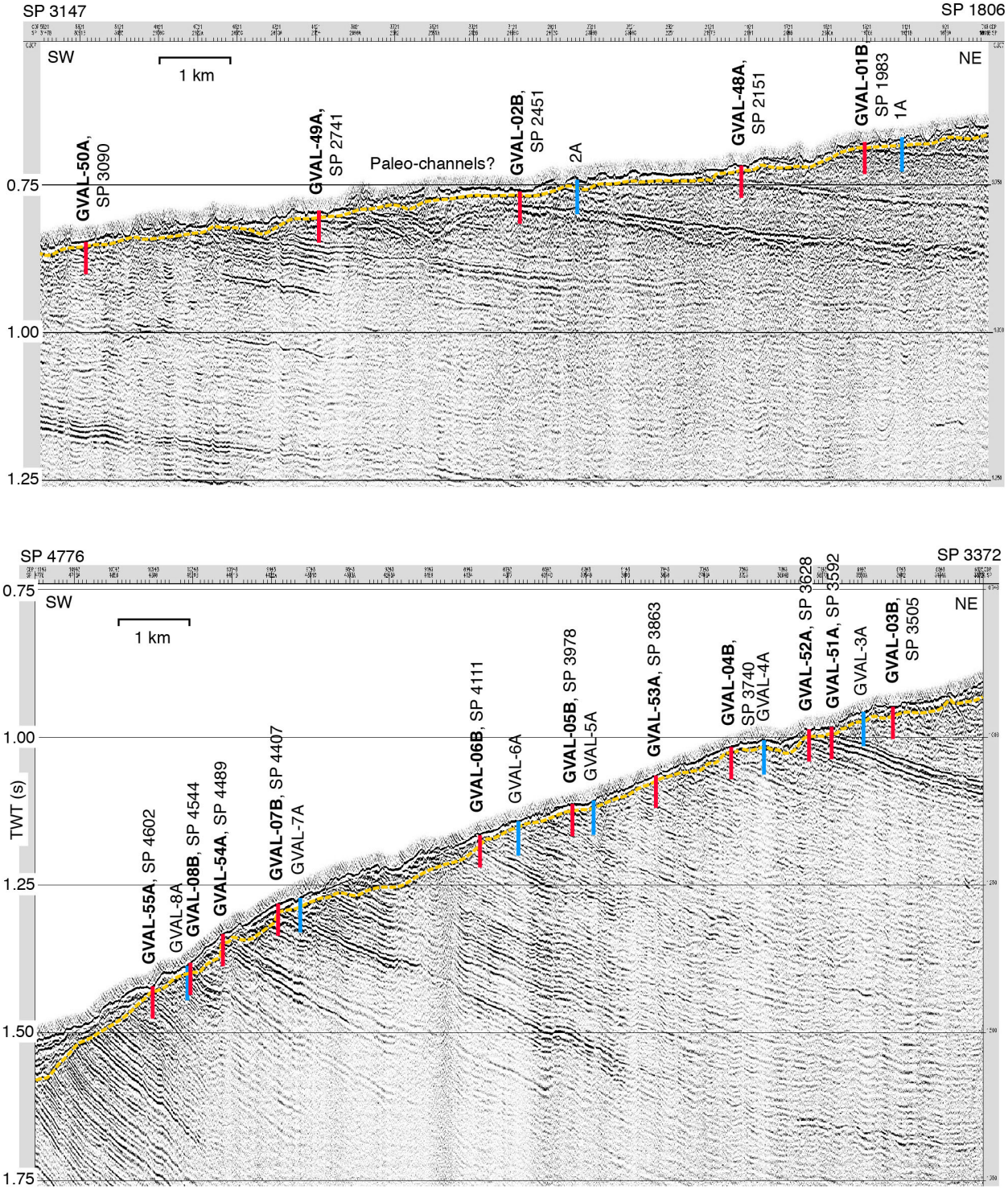

Figure 6. Seismic profile NBP-1402-2. NE section of the profile in the upper panel, with the continuation to the SW in the lower panel. New sites in 813-Add are marked in red (see also Table 2); the projections of the original 813-Full sites are marked in blue. The base of the late glacial diamicton (till) is marked in yellow. The bright reflectors outcropping to the right of the lower plot at Site GVAL-52A are caused by a layer of lithified poorly-sorted sandstone with angular clasts, samples of which were dredged from that location during NBP-1402.

4. Submission of new site survey to the SSDB and next steps

The new *N.B. Palmer* NBP-1402 seismic profile SEG-Y data and navigation files were uploaded to the Site Survey Data Bank in June 2014. Uploading of site forms for the new holes will take place in September 2014.

The proponents are working with ECORD/ESO on the details of the operations plan and on finding an research vessel that is capable of operating in sea ice, is able to deploy a sea bed drill rig, and is available to IODP.

Table 2. Locations of new sites described in 813-Add. Shotpoints are along seismic line NBP-1402-2.

Site	SP	CDP	Latitude (shot)	Longitude (shot)
GVAL-01B	1983	1355	-66.75330	145.57758
GVAL-02B	2451	3064	-66.79061	145.50154
GVAL-03B	3505	6797	-66.87225	145.33555
GVAL-04B	3740	7611	-66.88992	145.29893
GVAL-05B	3978	8432	-66.90775	145.26198
GVAL-06B	4111	8869	-66.91747	145.24298
GVAL-07B	4407	9902	-66.93991	145.19657
GVAL-08B	4544	10367	-66.94996	145.17540
GVAL-48A	2151	1966	-66.76673	145.55076
GVAL-49A	2741	4084	-66.81298	145.45648
GVAL-50A	3090	5325	-66.84020	145.40150
GVAL-51A	3592	7096	-66.87877	145.32210
GVAL-52A	3628	7225	-66.88164	145.31657
GVAL-53A	3863	8040	-66.89937	145.27999
GVAL-54A	4489	10178	-66.94599	145.18432
GVAL-55A	4602	10570	-66.95434	145.16618

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Late Eocene cooling, precursor interglacials? Youngest available strata along NBP-1402-2. Primary site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-01B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#			
Latitude:	Deg: -66.75330	Jurisdiction:	Antarctic Treaty
Longitude:	Deg: 145.57758	Distance to Land: (km)	58
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	511

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by if351_pdf
(user 0.3405)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-01B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	yes	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Location: 1983
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation	yes		
17 Other			

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(user 0.9834)

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-01B	Date Form Submitted:	
Water Depth (m):	511	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.4528)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-01B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.6488)

Proposal #:	813 - Add	Site #:	GVAL-01B	Date Form Subm.:	2014-10-01 19:40:20

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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(user 0.3079)

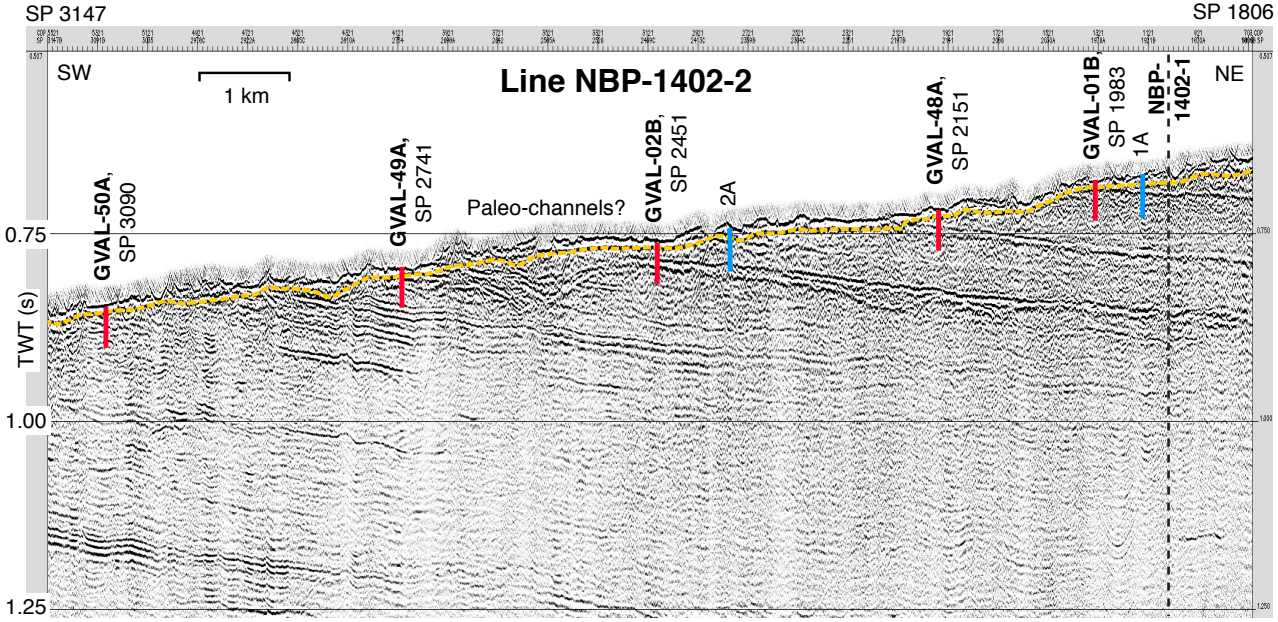
Proposal #:	813 - Add	Site #:	GVAL-01B	Date Form Subm.:	2014-10-01 19:40:20

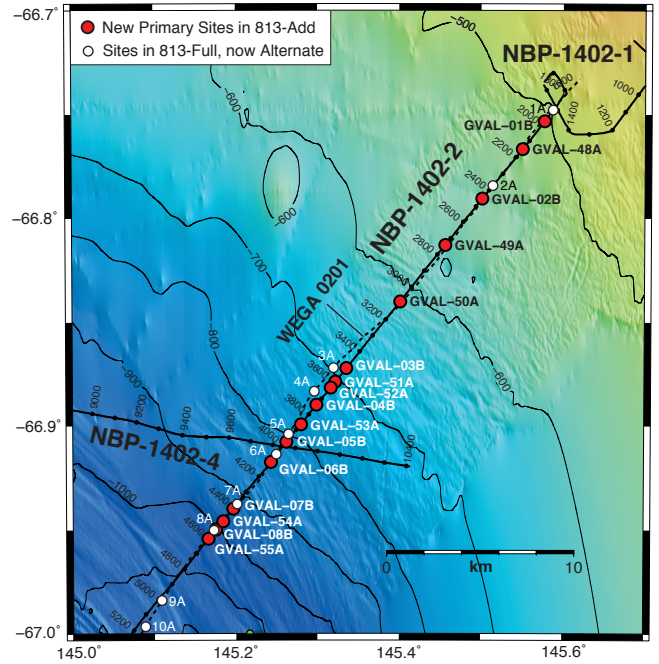
Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

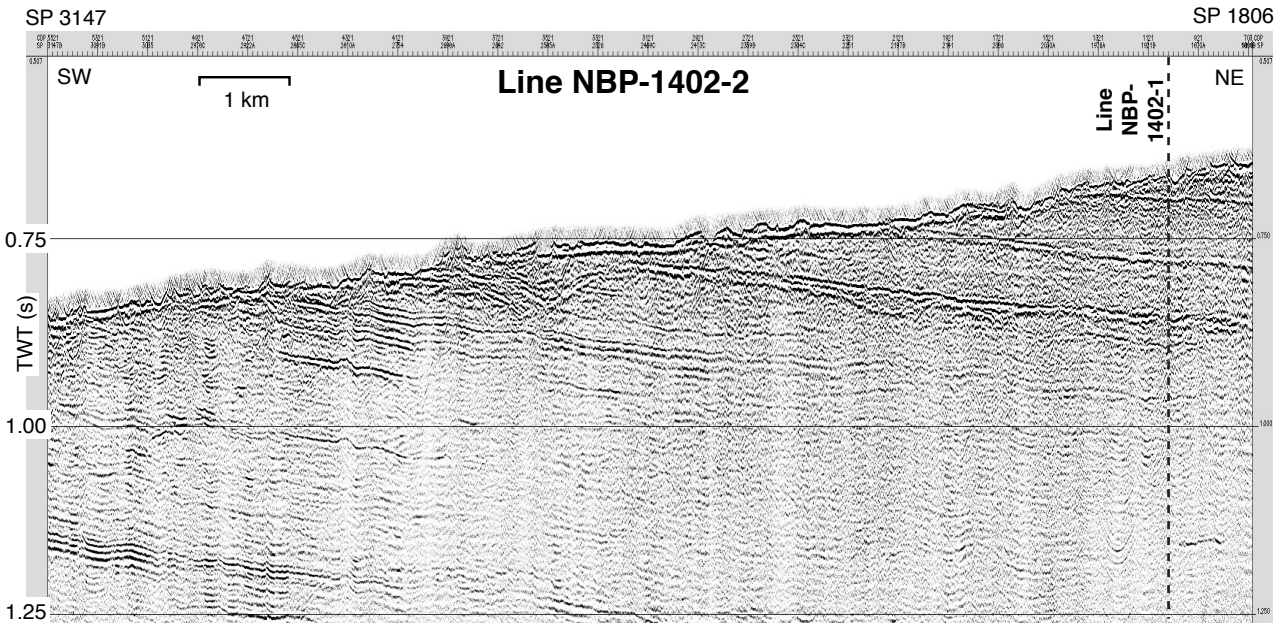
Proposal 813, Addendum
George V Land Shelf, Antarctica: Cenozoic Paleoclimate

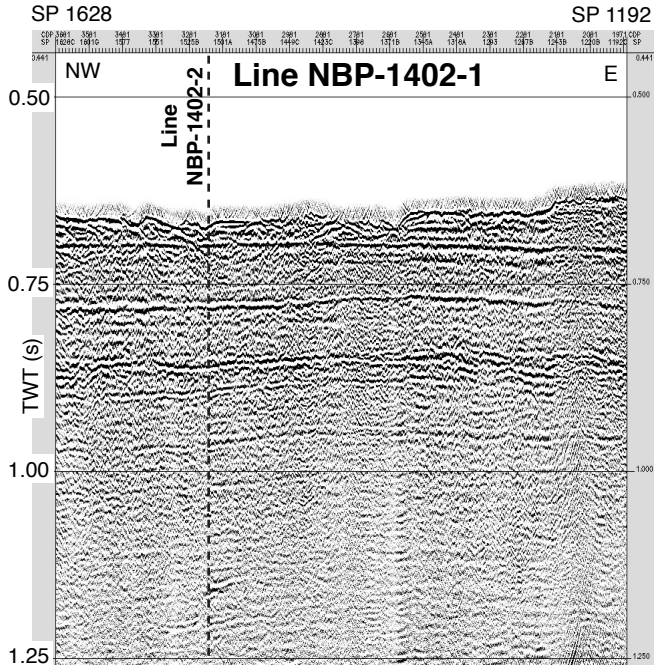
Site Summary Form 6

Sites: GVAL-48A
GVAL-01B GVAL-49A
GVAL-02B GVAL-50A









IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Late Eocene cooling, precursor interglacials? Youngest available strata along NBP-1402-2. Primary site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-48A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.76673	Distance to Land: (km)	56
Longitude:	Deg: 145.55076		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	539

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Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-48A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	yes	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Location: 1983
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation	yes		
17 Other			

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(user 0.7881)

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-48A	Date Form Submitted:	
Water Depth (m):	539	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.5891)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-48A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 3.2534)

Proposal #:	813 - Add	Site #:	GVAL-48A	Date Form Subm.:	2014-10-02 19:54:52

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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(user 0.4314)

Proposal #:	813 - Add	Site #:	GVAL-48A	Date Form Subm.:	2014-10-02 19:54:52

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-1B,
which covers the following sites:

GVAL-01B
GVAL-02B
GVAL-48A
GVAL-49A
GVAL-50A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-02B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.79061	Distance to Land: (km)	50
Longitude:	Deg: 145.50154		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	570

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(user 0.3197)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.3197)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-02B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	yes	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 2451
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		3.5 kHz profiles are available for line WEGA 02-01
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.5348)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-02B	Date Form Submitted:	
Water Depth (m):	570	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.6825)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-02B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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by if354_t_pdf / kk+w 2007 - 2011
(user 4.2889)

Proposal #:	813 - Add	Site #:	GVAL-02B	Date Form Subm.:	2014-10-01 22:02:20

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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(user 0.3706)

Proposal #:	813 - Add	Site #:	GVAL-02B	Date Form Subm.:	2014-10-01 22:02:20

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-1B,
which covers the following sites:

GVAL-01B
GVAL-02B
GVAL-48A
GVAL-49A
GVAL-50A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-50A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.84020	Distance to Land: (km)	43
Longitude:	Deg: 145.40150		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	635

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(user 0.2536)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.2536)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-50A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	yes	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 2451
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		3.5 kHz profiles are available for line WEGA 02-01
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.5187)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-50A	Date Form Submitted:	
Water Depth (m):	635	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 3.3720)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-50A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.7521)

Proposal #:	813 - Add	Site #:	GVAL-50A	Date Form Subm.:	2014-10-02 20:02:27

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

generated: Mon Oct 13 14:17:48 2014
by if355_pdf / kk+w 2007 - 2011
(user 0.4486)

Proposal #:	813 - Add	Site #:	GVAL-50A	Date Form Subm.:	2014-10-02 20:02:27

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-1B,
which covers the following sites:

GVAL-01B
GVAL-02B
GVAL-48A
GVAL-49A
GVAL-50A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Late Eocene cooling, precursor interglacials? Can Antarctica sustain any ice sheets when the atmosphere is above 1000 ppm CO2? Nature of high amplitude reflector. In alternate seismic interpretation, this site could be Oligocene in age and contain glacial sediments. Primary site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-49A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.81298	Distance to Land: (km)	47
Longitude:	Deg: 145.45648		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	598

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by if351_pdf
(user 0.1914)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-49A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	yes	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 2451
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		3.5 kHz profiles are available for line WEGA 02-01
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 1.0426)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-49A	Date Form Submitted:	
Water Depth (m):	598	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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by if353_t_pdf / kk+w 2007 - 2011
(user 0.5949)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-49A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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by if354_t_pdf / kk+w 2007 - 2011
(user 0.5436)

Proposal #:	813 - Add	Site #:	GVAL-49A	Date Form Subm.:	2014-10-02 19:59:09

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

generated: Mon Oct 13 14:18:05 2014
by if355_pdf / kk+w 2007 - 2011
(user 0.6750)

Proposal #:	813 - Add	Site #:	GVAL-49A	Date Form Subm.:	2014-10-02 19:59:09

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-1B,
which covers the following sites:

GVAL-01B
GVAL-02B
GVAL-48A
GVAL-49A
GVAL-50A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle/Late Eocene climate conditions, nature of paleoenvironmental change represented by underlying high-amplitude reflector. Primary site. In alternate seismic interpretation, this site could be early Oligocene in age and contain glacial sediments.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-03B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.87225	Distance to Land: (km)	40
Longitude:	Deg: 145.33555		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	711

generated: Mon Oct 13 14:18:14 2014
by if351_pdf
(user 0.3358)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 Logging: 0.2 Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

generated: Mon Oct 13 14:18:14 2014
by if351_pdf
(user 0.3358)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-03B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3505
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-03B	Date Form Submitted:	
Water Depth (m):	711	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.3548)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-03B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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IODP Site Summary Forms: Form 5 – Lithologies

Proposal #:	813 - Add	Site #:	GVAL-03B	Date Form Subm.:	2014-10-01 22:02:35

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80	Middle/Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict	

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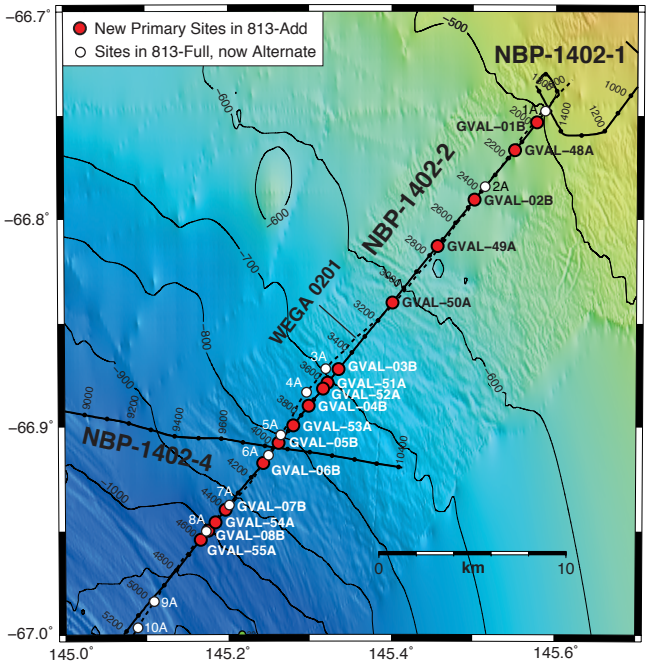
(user 0.5997)

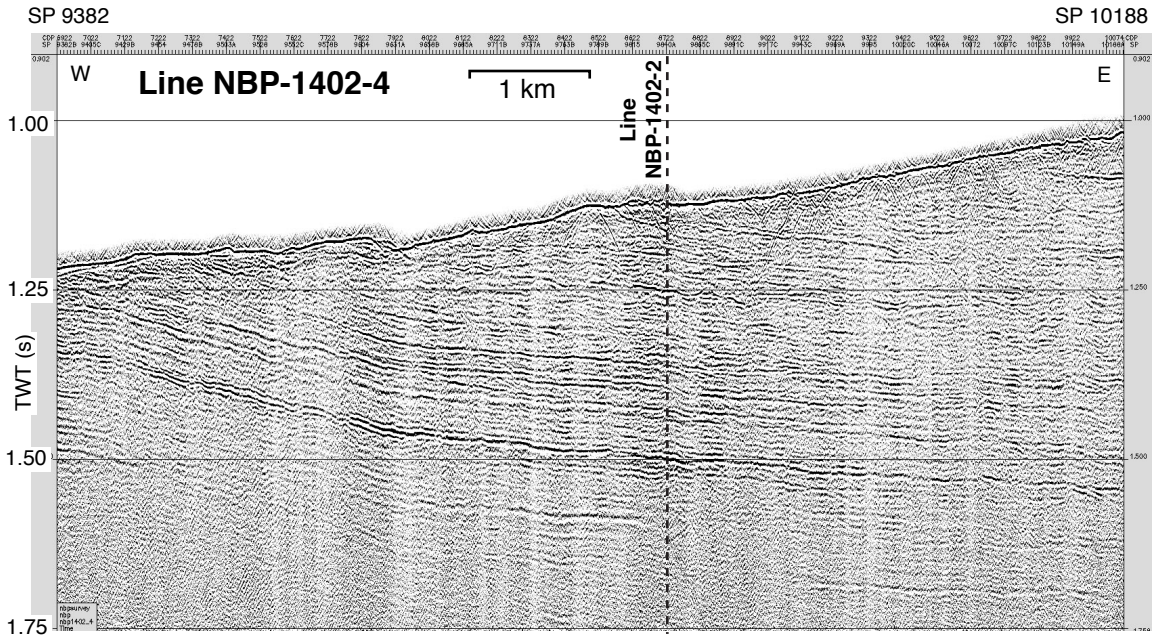
Proposal #:	813 - Add	Site #:	GVAL-03B	Date Form Subm.:	2014-10-01 22:02:35

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

Proposal 813, Addendum
George V Land Shelf, Antarctica: Cenozoic Paleoclimate

Site Summary Form 6

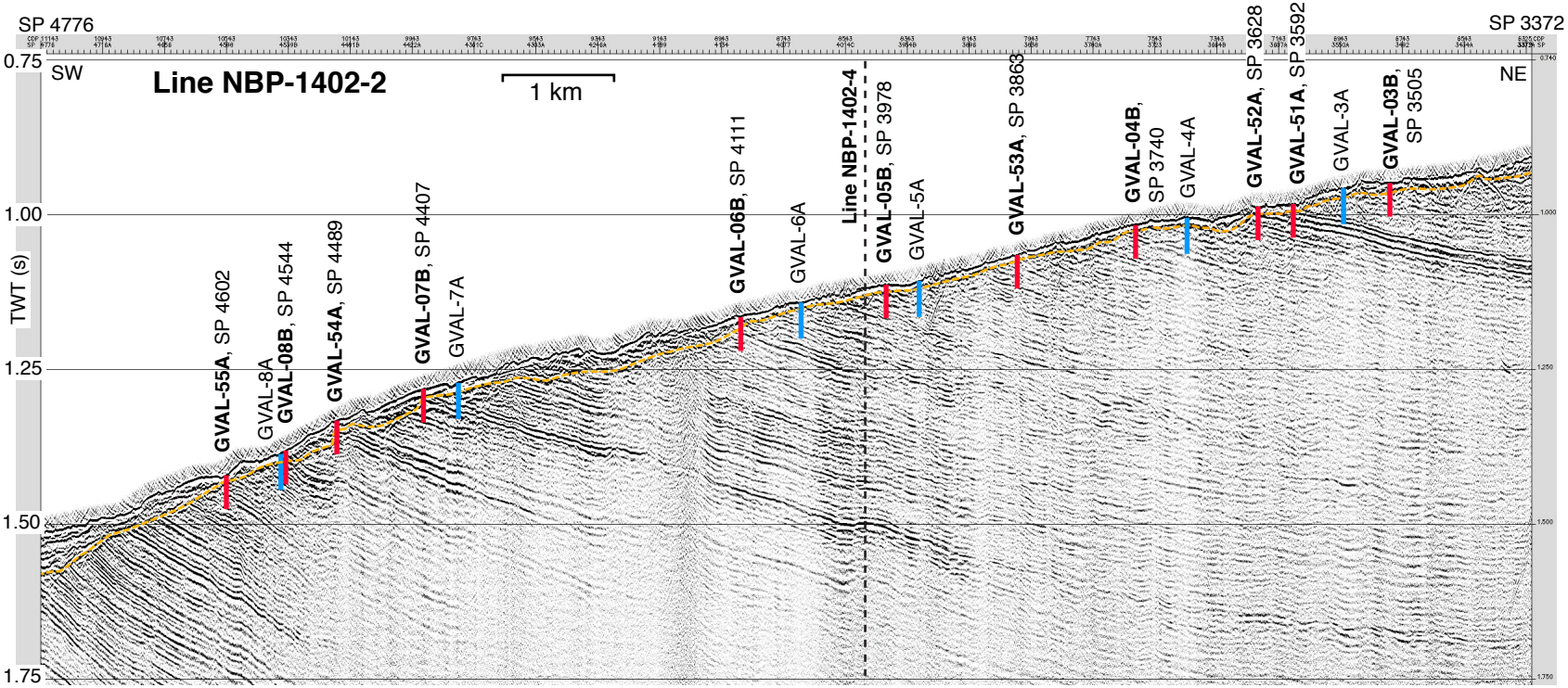




Sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A



IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle/Late Eocene climate conditions, nature of paleoenvironmental change represented by underlying high-amplitude reflector. Primary site. In alternate seismic interpretation, this site could be late Eocene and earliest Oligocene in age and contain glacial sediments.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-51A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.87877	Distance to Land: (km)	40
Longitude:	Deg: 145.32210		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	737

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(user 0.3328)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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by if351_pdf
(user 0.3328)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-51A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3505
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-51A	Date Form Submitted:	
Water Depth (m):	737	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.6726)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-51A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.6186)

IODP Site Summary Forms: Form 5 – Lithologies

Proposal #:	813 - Add	Site #:	GVAL-51A	Date Form Subm.:	2014-10-02 20:05:17

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80	Middle/Late Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict	

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(user 5.0599)

Proposal #:	813 - Add	Site #:	GVAL-51A	Date Form Subm.:	2014-10-02 20:05:17

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle Eocene climate conditions, nature of paleoenvironmental change represented by overlying high-amplitude reflector. Primary Site. In our alternate seismic interpretation, this site could be late Eocene in age.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-04B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.88992	Distance to Land: (km)	39
Longitude:	Deg: 145.29893		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	765

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(user 0.1562)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	
Total Penetration (m):	80	

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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by if351_pdf
(user 0.1562)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-04B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3740
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-04B	Date Form Submitted:	
Water Depth (m):	765	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.6738)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-04B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.6140)

Proposal #:	813 - Add	Site #:	GVAL-04B	Date Form Subm.:	2014-10-01 22:02:49

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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by if355_pdf / kk+w 2007 - 2011
(user 3.3636)

Proposal #:	813 - Add	Site #:	GVAL-04B	Date Form Subm.:	2014-10-01 22:02:49

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle Eocene climate conditions, nature of paleoenvironmental change represented by overlying high-amplitude reflector. Primary Site. In our alternate seismic interpretation, this site could be latest Eocene in age.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-52A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#			
Latitude:	Deg: -66.88164	Jurisdiction:	Antarctic Treaty
Longitude:	Deg: 145.31657	Distance to Land: (km)	39
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	742

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by if351_pdf
(user 0.1567)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, and conglomerate

Coring Plan: (Specify or check): Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-52A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3740
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.9667)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-52A	Date Form Submitted:	
Water Depth (m):	742	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.4213)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-52A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but not oil or gas.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 4.3706)

Proposal #:	813 - Add	Site #:	GVAL-52A	Date Form Subm.:	2014-10-02 20:10:16

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, and conglomerate	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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(user 0.6741)

Proposal #:	813 - Add	Site #:	GVAL-52A	Date Form Subm.:	2014-10-02 20:10:16

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle Eocene climate and environmental conditions, nature of paleoenvironmental change (close to Dredge 1). This site could be late Eocene in our alternate interpretation of the seismic profiles. Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-05B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#			
Latitude:	Deg: -66.90775	Jurisdiction:	Antarctic Treaty
Longitude:	Deg: 145.26198	Distance to Land: (km)	35
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	836

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(user 0.3337)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.3337)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-05B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3978
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.8781)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-05B	Date Form Submitted:	
Water Depth (m):	836	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.6701)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-05B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 4.6269)

Proposal #:	813 - Add	Site #:	GVAL-05B	Date Form Subm.:	2014-10-01 22:03:13

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

generated: Mon Oct 13 14:19:37 2014
by if355_pdf / kk+w 2007 - 2011
(user 0.4316)

Proposal #:	813 - Add	Site #:	GVAL-05B	Date Form Subm.:	2014-10-01 22:03:13

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle Eocene climate and environmental conditions, nature of paleoenvironmental change (close to Dredge 1). This site could be late Eocene in our alternate interpretation of the seismic profiles. Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-53A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#			
Latitude:	Deg: -66.89937	Jurisdiction:	Antarctic Treaty
Longitude:	Deg: 145.27999	Distance to Land: (km)	36
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	805

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(user 0.3154)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	
Total Penetration (m):	80	

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.3154)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-53A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 3978
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.8462)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-53A	Date Form Submitted:	
Water Depth (m):	805	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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by if353_t_pdf / kk+w 2007 - 2011
(user 0.6422)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-53A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.3907)

Proposal #:	813 - Add	Site #:	GVAL-53A	Date Form Subm.:	2014-10-02 20:13:45

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

generated: Mon Oct 13 14:19:55 2014
by if355_pdf / kk+w 2007 - 2011
(user 0.5423)

Proposal #:	813 - Add	Site #:	GVAL-53A	Date Form Subm.:	2014-10-02 20:13:45

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Middle or Late Eocene climate and environmental conditions, nature of paleoenvironmental change (close to Dredge 1). Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-06B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.91747	Distance to Land: (km)	34
Longitude:	Deg: 145.24298		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	870

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(user 0.1585)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-06B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 4111
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.8886)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-06B	Date Form Submitted:	
Water Depth (m):	870	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 4.1209)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-06B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.7183)

IODP Site Summary Forms: Form 5 – Lithologies

Proposal #:	813 - Add	Site #:	GVAL-06B	Date Form Subm.:	2014-10-01 22:03:22

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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by if355_pdf / kk+w 2007 - 2011
(user 0.3097)

Proposal #:	813 - Add	Site #:	GVAL-06B	Date Form Subm.:	2014-10-01 22:03:22

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-07B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.93991	Distance to Land: (km)	31
Longitude:	Deg: 145.19657		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	961

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(user 0.1561)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 Logging: 0.2 Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.1561)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-07B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 4407
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-07B	Date Form Submitted:	
Water Depth (m):	961	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 3.9742)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-07B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.5332)

IODP Site Summary Forms: Form 5 – Lithologies

Proposal #:	813 - Add	Site #:	GVAL-07B	Date Form Subm.:	2014-10-01 22:03:34

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80	Early/Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict	

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(user 0.6648)

Proposal #:	813 - Add	Site #:	GVAL-07B	Date Form Subm.:	2014-10-01 22:03:34

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

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(user 0.4059)

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-54A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#			
Latitude:	Deg: -66.94599	Jurisdiction:	Antarctic Treaty
Longitude:	Deg: 145.18432	Distance to Land: (km)	30
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	996

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(user 0.2722)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.2722)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-54A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 4407
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-54A	Date Form Submitted:	
Water Depth (m):	996	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.6997)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-54A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.3501)

IODP Site Summary Forms: Form 5 – Lithologies

Proposal #:	813 - Add	Site #:	GVAL-54A	Date Form Subm.:	2014-10-02 20:16:32

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80	Early/Middle Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict	

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(user 0.4844)

Proposal #:	813 - Add	Site #:	GVAL-54A	Date Form Subm.:	2014-10-02 20:16:32

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-08B	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.94996	Distance to Land: (km)	30
Longitude:	Deg: 145.17540		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	1037

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Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	
Total Penetration (m):	80	

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from ____ m to ____ m ____ m intervals

from ____ m to ____ m ____ m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 | Logging: 0.2 | Total On-site: ____

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	Preferred weather window: mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.1576)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-08B	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 4544
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-08B	Date Form Submitted:	
Water Depth (m):	1037	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.4098)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-08B	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.6305)

Proposal #:	813 - Add	Site #:	GVAL-08B	Date Form Subm.:	2014-10-01 22:03:45

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Early Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

generated: Mon Oct 13 14:21:04 2014
by if355_pdf / kk+w 2007 - 2011
(user 0.5063)

Proposal #:	813 - Add	Site #:	GVAL-08B	Date Form Subm.:	2014-10-01 22:03:45

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

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(user 0.3305)

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A

IODP Site Summary Forms:

Form 1 – General Site Information

813 - Add

Section A: Proposal Information

Title of Proposal:	Greenhouse to Icehouse Antarctic paleoclimate and ice history from George V Land and Adélie Land shelf sediments
Date Form Submitted:	
Site Specific Objectives with Priority (Must include general objectives in proposal)	Early/Middle Eocene climate and environmental conditions. Pre-unconformity A. Hyperthermals? Primary Site.
List Previous Drilling in Area:	IODP 318

Section B: General Site Information

Site Name:	GVAL-55A	Area or Location:	George V Land shelf
If site is a reoccupation of an old DSDP/ODP Site, Please include former Site#		Jurisdiction:	Antarctic Treaty
Latitude:	Deg: -66.95434	Distance to Land: (km)	30
Longitude:	Deg: 145.16618		
Coordinate System:	WGS 84		
Priority of Site:	Primary: yes Alt:	Water Depth (m):	1067

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(user 0.2682)

Section C: Operational Information

	Sediments	Basement
Proposed Penetration (m):	80	0
Total Sediment Thickness (m)	1000	

Total Penetration (m): 80

General Lithologies: Unconsolidated diamict overyling semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite

Coring Plan: (Specify or check)

Land MeBo drill rig on the sea bed and rotary core to 80m

APC ☐ XCB ☐ MDCB ☐ PCS ☐ RCB ☒ Re-entry ☐

Wireline Logging Plan:

Standard Measurements		Special Tools			
WL	☒	Magnetic Susceptibility	☐		
LWD	☐	Magnetic Field	☐	Formation Image (Acoustic)	☐
Porosity	☐	Borehole Temperature	☐	Formation Fluid Sampling	☐
Density	☐	Nuclear Magnetic Resonance	☐	Formation Temperature & Pressure	☐
Gamma Ray	☒	Geochemical	☐	VSP	☐
Resistivity	☐	Side-Wall Core Sampling	☐	Others:	other MeBo logging tools, as available
Sonic (Δt)	☐				
Formation Image (Res)	☐				
Check-shot (upon request)	☐				

Max. Borehole Temp.: 5 °C

Mud Logging: (Riser Holes Only)

Cuttings Sampling Intervals

from m to m m intervals

from m to m m intervals

Basic Sampling Intervals: 5m

Estimated Days: Drilling/Coring: 1.8 Logging: 0.2 Total On-site:

Observatory Plan: *Longterm Borehole Observation Plan/Re-entry Plan*

Potential Hazards/ Weather:

						Preferred weather window
Shallow Gas	☐	Complicated Seabed Condition	☒	Hydrothermal Activity	☐	mid-January to end of February (best chance for open water free of sea-ice)
Hydrocarbon	☐	Soft Seabed	☐	Landslide and Turbidity Current	☐	
Shallow Water Flow	☐	Currents	☐	Gas Hydrate	☐	
Abnormal Pressure	☐	Fracture Zone	☐	Diapir and Mud Volcano	☐	
Man-made Objects (e.g., sea-floor cables, dump sites)	☐	Fault	☐	High Temperature	☐	
H_2S	☐	High Dip Angle	☐	Ice Conditions	☒	
CO_2	☐	Sensitive marine habitat (e.g., reefs, vents)				

Other: Antarctic Treaty applies

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(user 0.2682)

IODP Site Summary Forms: Form 2 - Site Survey Detail

Proposal #:	813	Site #:	GVAL-55A	Date Form Submitted:	

*** Key to SSP Requirements**

X=required; X=may be required for specific sites; Y=recommended; Y*=may be recommended for specific sites; R=required for re-entry sites; T=required for high temperature environments; † Accurate velocity information is required for holes deeper than 400m.*

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
1a High resolution seismic reflection (primary)	no	X	multi-channel seismic line NBP-1402-2. Collected by the Sean Gulick and the UTIG group on the N.B.Palmer in February 2014. Already uploaded to SSDB. Location: 4544
1b High resolution seismic reflection (crossing)			Location:
2a Deep penetration seismic reflection (primary)			Location:
2b Deep penetration seismic reflection (crossing)			Location:
3 Seismic Velocity			
4 Seismic Grid			
5a Refraction (surface)			
5b Refraction (bottom)			
6 3.5 kHz	no		
7 Swath bathymetry	no		Multibeam bathymetry covers line NBP-1402-2, and is incorporated in the 100m-resolution bathymetry used in the maps in this proposal (Beaman et al., Antarctic Science, 2010). See Table 1 of Beaman et al. for list of original multibeam data.
8a Side looking sonar (surface)			
8b Side looking sonar (bottom)			
9 Photography or video			Photography and video was taken on the George V shelf by the Australian CEAMARC projec.
10 Heat Flow			
11a Magnetics			
11b Gravity			
12 Sediment cores	no		Several short sediment cores have been taken in the area by the Deep Freeze expedition (1979) and by NBP 01-01 (see Figure 1, main proposal).
13 Rock sampling			
14a Water current data			
14b Ice Conditions			Ice conditions are monitored by satellite: E.g. daily low res sea ice concentration: http://nsidc.org/dat a/seaice_index/ MODIS satellite images (Mertz area): nsidc.org/data/icesh elves_images/index_m odis.html On Exp 318, TeraScan sea ice images were most useful, and medium resolution sea ice images were provided by National Ice Center, Baltimore.
15 OBS microseismicity			
16 Navigation			Navigation data from the WEGA cruise is available from SDLS (Antarctic Seismic Data Library System)

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(user 0.4968)

Data Type	In SSDB	SSP Req.	Details of available data and data that are still to be collected
17 Other			

IODP Site Summary Forms:

Form 3 – Detailed Logging and Downhole Measurement Plan

Proposal #:	813	Site #:	GVAL-55A	Date Form Submitted:	
Water Depth (m):	1067	Sed. Penetration (m):	80	Basement Penetration (m):	0

Are high temperatures or other special requirements (e.g., unstable formations), anticipated for logging at this site?

Estimated total logging time for this site: 0.2

Measurement Type	Scientific Objective	Relevance (1=high, 3=low)
Check Shot Survey	n/a	
Nuclear Magnetic Resonance	n/a	
Geochemical	n/a	
Side-wall Core Sample	n/a	
Formation Fluid Sampling	n/a	
Borehole Temperature	n/a	
Magnetic Susceptibility	n/a	
Magnetic Field	n/a	
VSP	n/a	
Formation Image (Acoustic)	n/a	
Formation Pressure & Temperature	n/a	
Other (SET, SETP, ...)	We plan to use the natural gamma radiation downhole tool that was developed for the MeBo rig. This tool has been run successfully from MeBo. Other tools are in the planning stages.	1

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(user 0.5618)

IODP Site Summary Forms:

Form 4 – Environmental Protection

Proposal #:	813	Site #:	GVAL-55A	Date Form Submitted:	

Pollution & Safety Hazard	Comment
1. Summary of Operations at site.	Video survey to make sure there are no significant boulders at the MeBo landing site. Rotary core to 80 m or refusal. One hole per site.
2. All hydrocarbon occurrences based on previous DSDP/ODP/IODP drilling.	No hydrocarbon occurrences at Sites U1358, U1360, or U1357 on the George V shelf.
3. All commercial drilling in this area that produced or yielded significant hydrocarbon shows.	
4. Indications of gas hydrates at this location.	no indications of gas hydrates
5. Are there reasons to expect hydrocarbon accumulations at this site?	We might encounter lignite layers (Eocene, Cretaceous), but oil or gas will be very unlikely at these drilling depths.
6. What "special" precautions will be taken during drilling?	
7. What abandonment procedures need to be followed?	
8. Natural or manmade hazards which may effect ship's operations.	The major hazard will be sea ice and icebergs of various sizes. If the MeBo rig is deployed from an A-frame, rather than a moon pool, which is likely, the umbilical will have to be protected. Probably this will require a frame or cage to be constructed.
9. Summary: What do you consider the major risks in drilling at this site?	Sea ice and icebergs of various sizes.

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(user 0.4449)

Proposal #:	813 - Add	Site #:	GVAL-55A	Date Form Subm.:	2014-10-02 20:19:07

Subbottom depth (m)	Key reflectors, Unconformities, faults, etc	Age	Assumed velocity (km/sec)	Lithology	Paleo-environment	Avg. rate of sed. accum. (m/My)	Comments
0-80		Early Eocene	1.8	semi-lithified siltstone, mudstone, sandstone, conglomerate, and lignite	siliciclastic shallow shelf	100	Target sediments overlain by 0 to ?20m of late glacial unconsolidated diamict

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by if355_pdf / kk+w 2007 - 2011
(user 0.5826)

Proposal #:	813 - Add	Site #:	GVAL-55A	Date Form Subm.:	2014-10-02 20:19:07

Site Summary Figure Comment	See Site Summary Figure for GVAL-01A, which covers the whole transect of sites along line WEGA 02-01 (Sites GVAL 01-10).

For Site Form 6, see Form 6 for Site GVAL-3B, which covers the following sites:

GVAL-03B
GVAL-04B
GVAL-05B
GVAL-06B
GVAL-07B
GVAL-08B

GVAL-51A
GVAL-52A
GVAL-53A
GVAL-54A
GVAL-55A