730-Full2: Drilling the late Quaternary coral record of climate and sea level on subsiding reefs at Sabine Bank and Bougainville Guyot, Vanuatu

Proponents:

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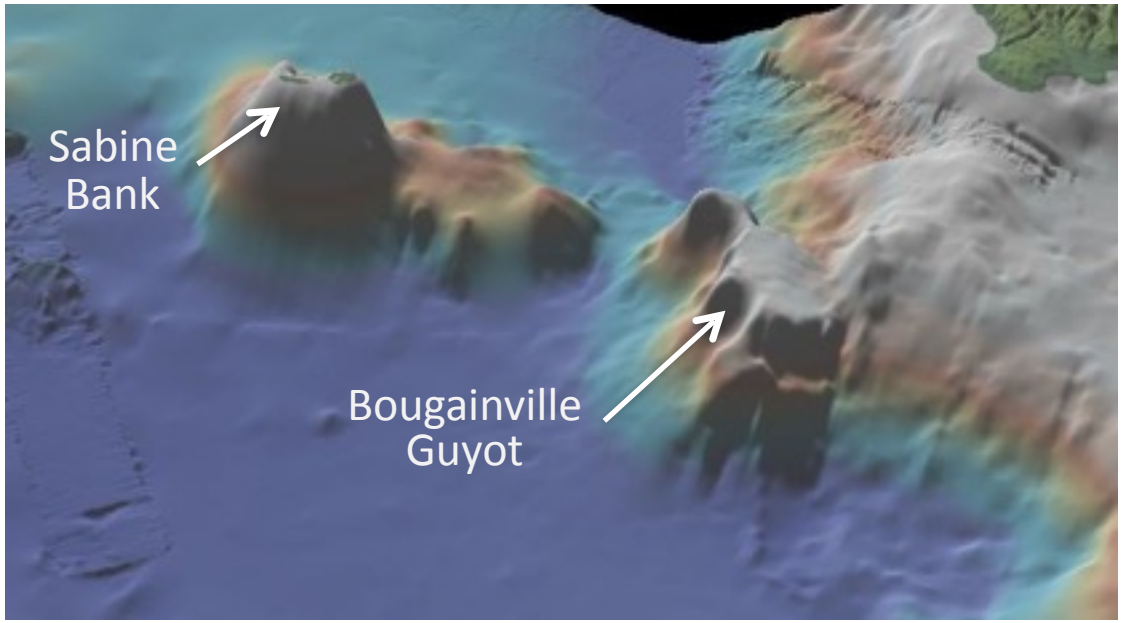
G. Cabioch	E. Garaebiti-Bule	M. Harrison	C-C. Shen
L. Lavier	J. Partin	T. Quinn	**W. Kim**

Overarching goal: Recover many fossil corals of many ages (extending back to ~MIS11), to understand sea level and surface ocean changes and climate connections over glacial-interglacial cycles and sub-annually.



Site	Bathy (m)	TD (m)
SAB-6A	110	150
SAB-5A	95	150
SAB-4B	70	150
SAB-3B	26	150
SAB-2B	14	150
SAB-1B	46	150

Site	Bathy (m)	TD (m)
BG-5A	1400	150
BG-4B	750	150
BG-3B	875	150
BG-2B	950	150
BG-1B	1050	150

IODP

Proposal History

- May, 2008: Pre reviewed by SSEP
- May, 2009: Pre2 reviewed by SSEP
- July, 2009: Pre2 reviewed by SSP
- Dec., 2011: Pre2 reviewed by PEP; requested Full
- June, 2014: Full reviewed by SEP; requested revised Full
- July, 2015: Full2 reviewed by SEP; sent for external review
- June, 2016: Forwarded to EFB with “excellent” rating; sites classified as “2” (data are sufficient to support the scientific objectives, but minor issues require follow-up by proponents)

Bougainville Guyot

Operations (MeBo to 150 m)

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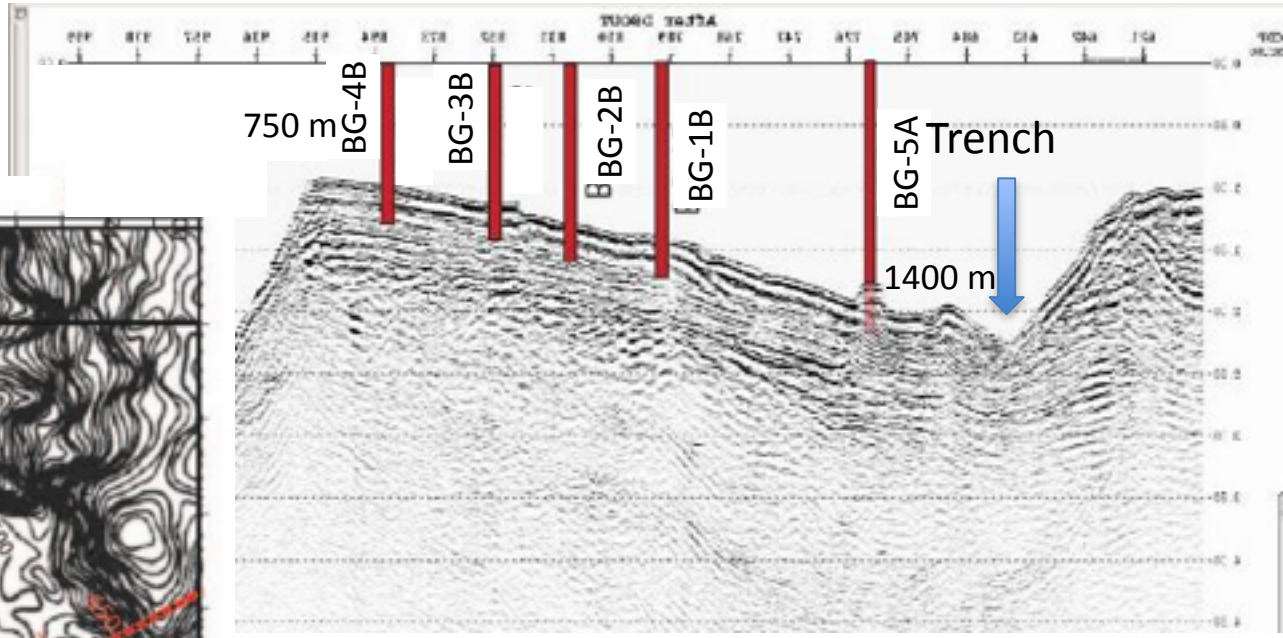

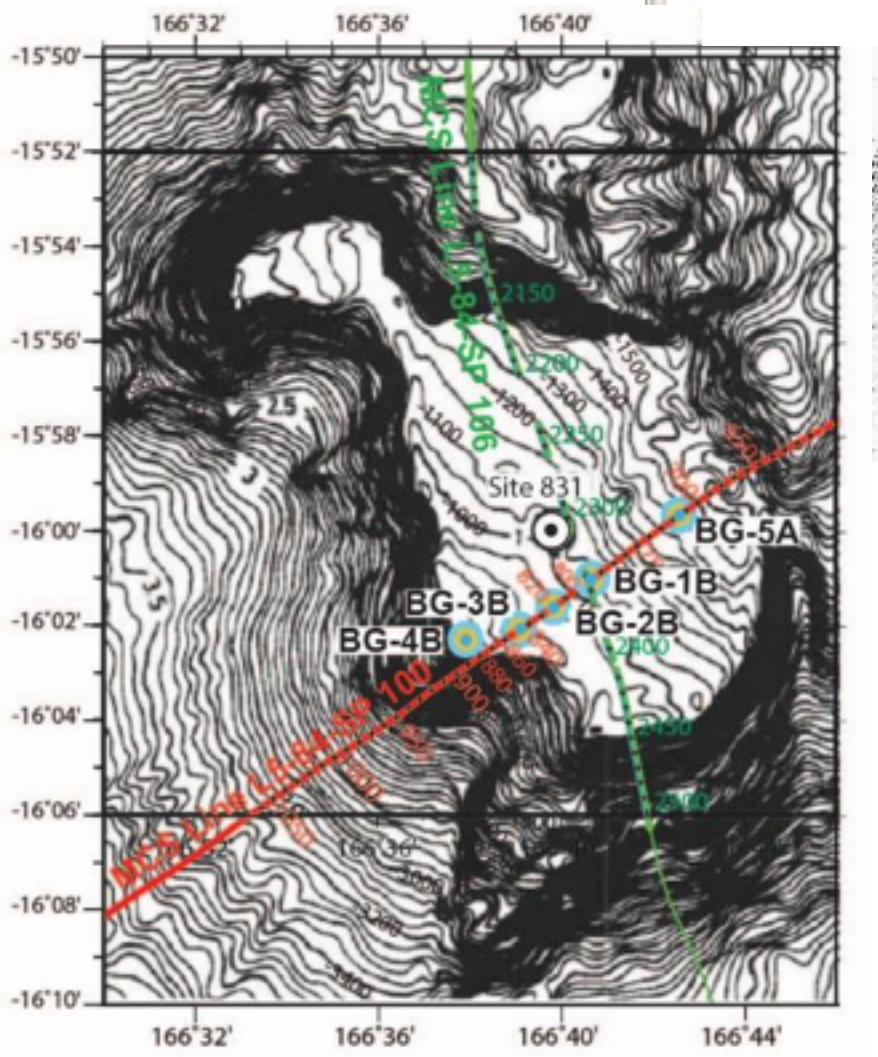

FULL 2

BG-5A
BG-4B – corrected location
BG-3B
BG-2B
BG-1B

Site 831 (Leg 134) drilled to 727 mbsf

Late Pleistocene coral reef recovered to ~350 mbsf.

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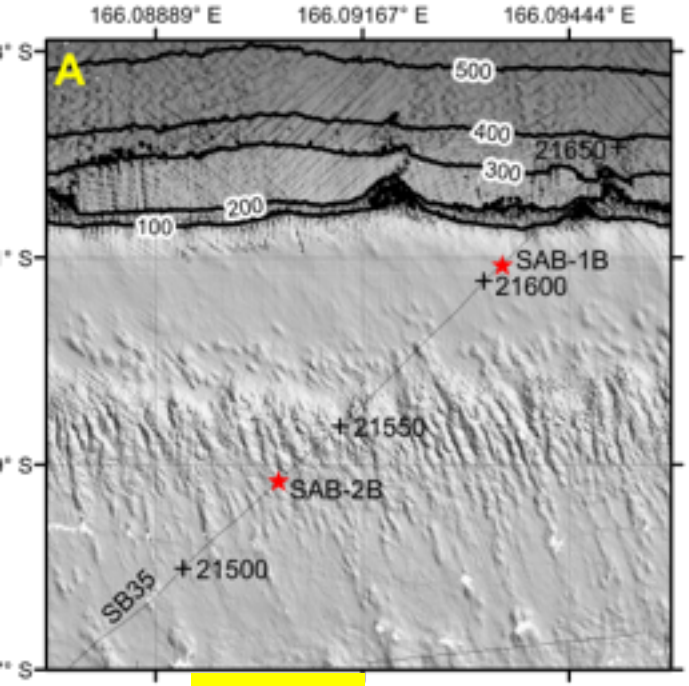
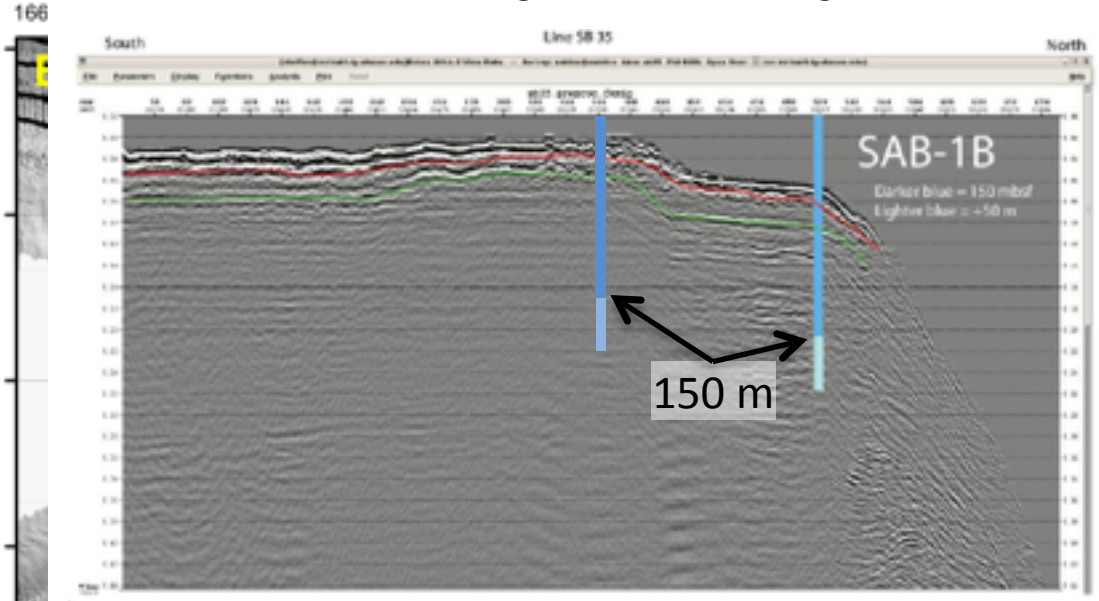
Sabine Bank

Operations => MeBo to 150 m

730-Full2 - Taylor



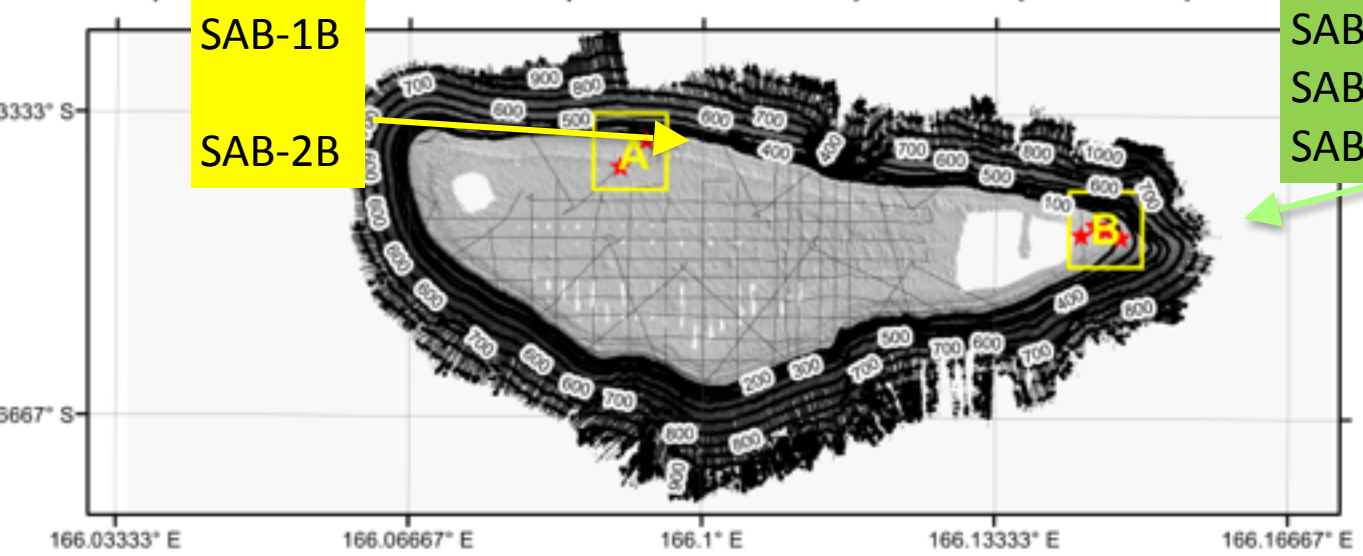
SAB-2B SAB-1B



SAB-1B

SAB-2B

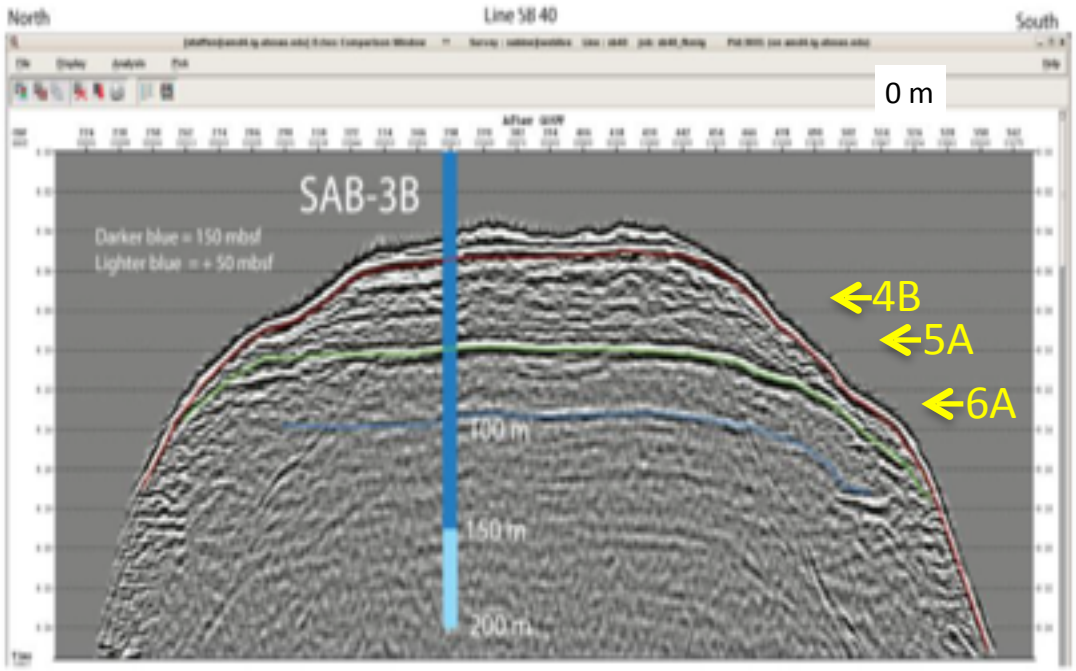
SAB-3B
SAB-4B
SAB-5A
SAB-6A

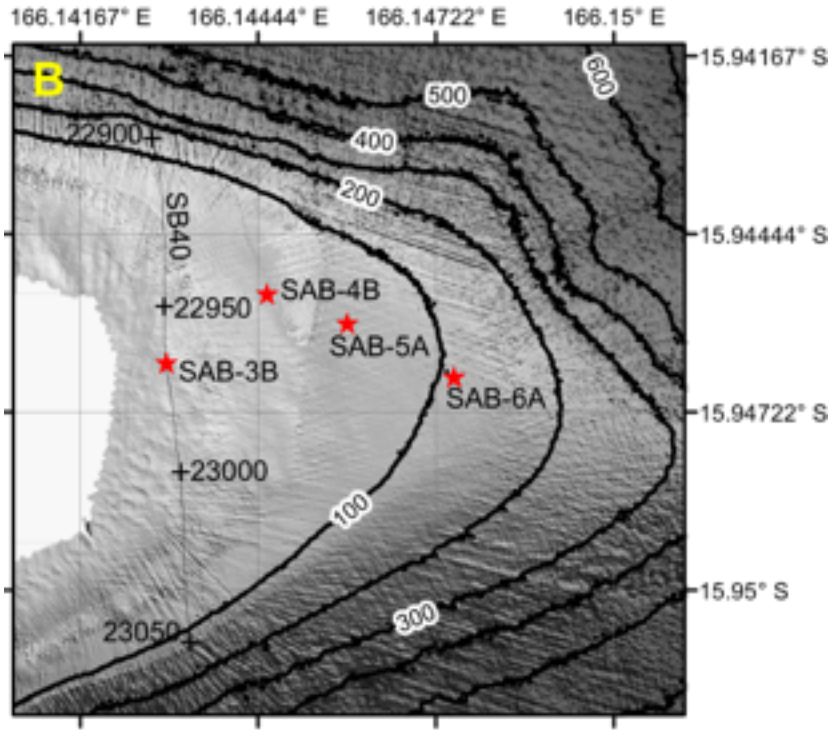


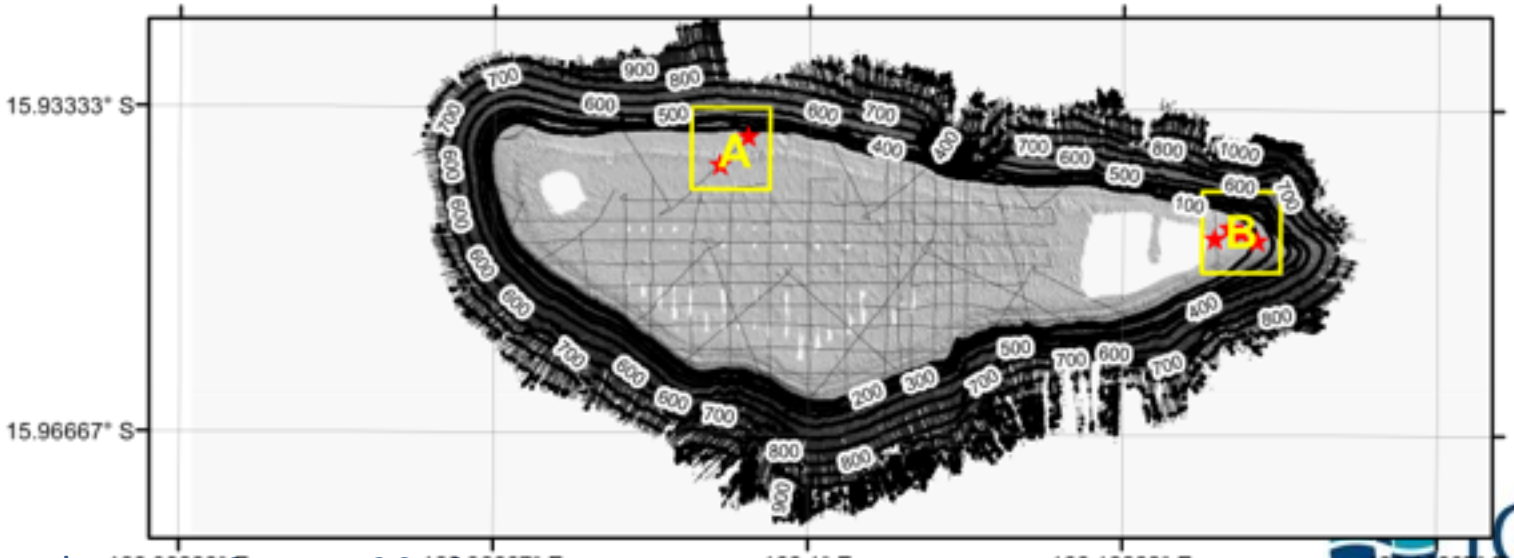
max. recovery to 150 mbsf - post-glacial transgressive reefs; MIS5 reefs.

IODP

Sabine Bank


North
Line SB 40
South
0 m
SAB-3B
Darker blue = 150 mbsf
Lighter blue = + 50 mbsf
4B
5A
6A
100 m
150 m
200 m


166.14167° E
166.14444° E
166.14722° E
166.15° E
15.94167° S
15.94444° S
15.94722° S
15.95° S
B
22900+
SB40
+22950
SAB-4B
SAB-5A
SAB-3B
SAB-6A
+23000
23050+
500
400
200
600
100
300


15.93333° S
15.96667° S
A
B
166.1° E
166.13333° E

Data Requirements for Ocean & Climate Proposals

Ideal Data Set

Seismic

- High resolution MCS (or SCS where target depth is <100mbsf).
- MCS grid, 2d or 3d depending on target.
- Sites ideally located on or near crossing lines.
- Seismic velocities appropriate to demonstrate the local velocity fields.
- High resolution sub-bottom profiling data for very shallow targets.

Bathymetry/Backscatter

- High resolution bathymetry.
- Acoustic backscatter (side-scan or multibeam) to characterize the seafloor.

Samples or Observations (if available)

- Surface samples => surface sedimentary composition and structure for shallow targets and expected gas seeps of fluid flow.
- Video/photography if hard irregular outcrop (e.g. a reef, or basalt outcrop).

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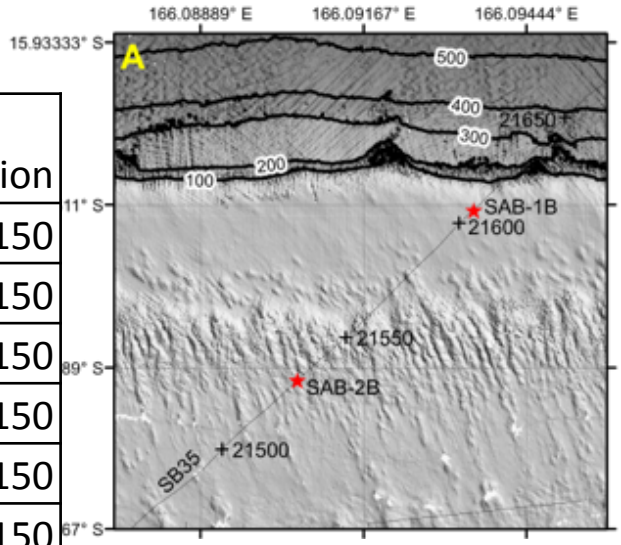
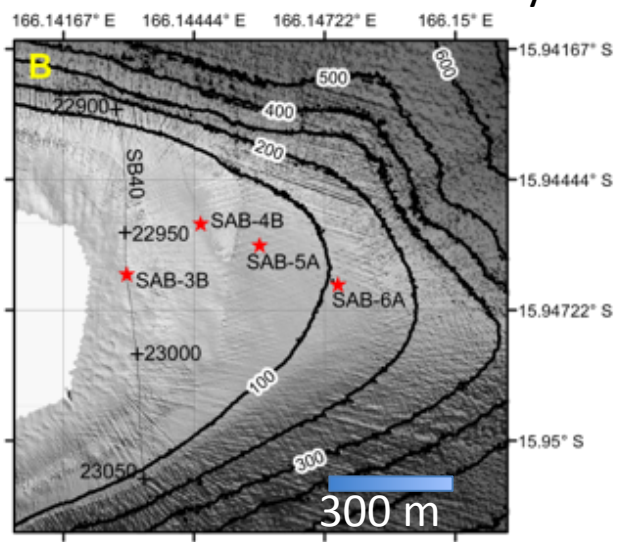
Data Requirements

730-Full2 - Taylor

Sabine Bank

Site	Bathy (m)	Penetration
SAB-6A	110	150
SAB-5A	95	150
SAB-4B	70	150
SAB-3B	26	150
SAB-2B	14	150
SAB-1B	46	150



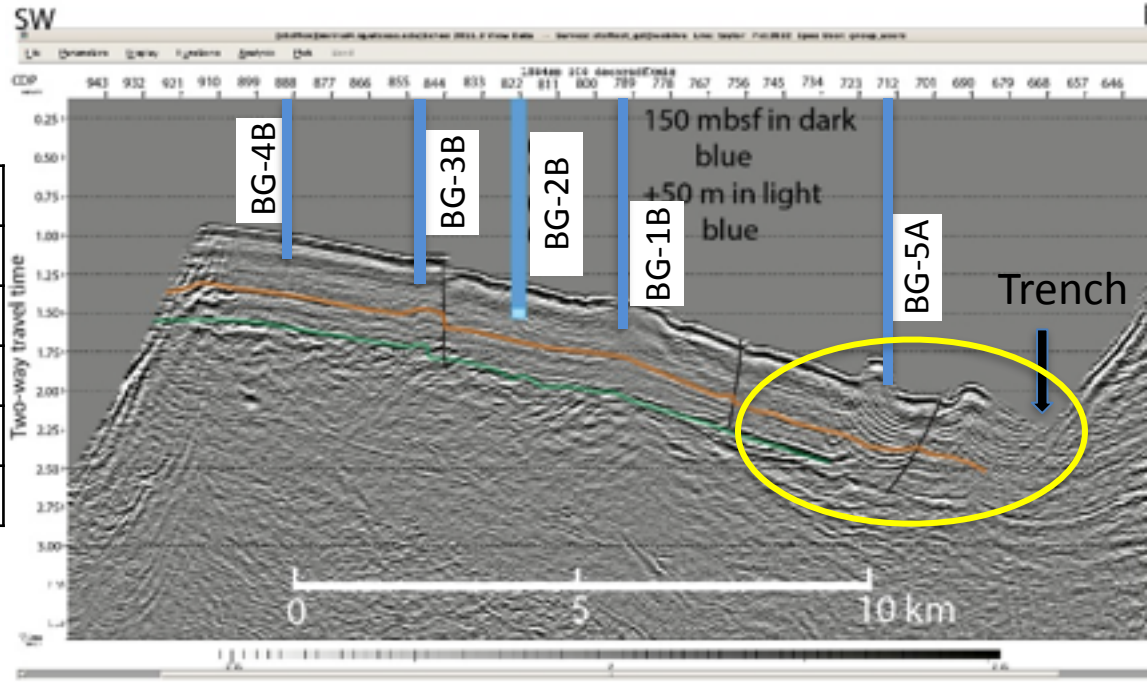


	SAB-1B	SAB-2B	SAB-3B	SAB-4B	SAB-5A	SAB-6A
Seismic	SB35 (no xing) 515/21605	SB35 (no xing) 367/21531	SB40 (no xing) 359/22963	150 m away Too steep? 25-30°?	300 m away Too steep?	450 m away Too steep?
Seismic Vel.	Assume 2 km/s					
MCS grid	Numerous lines in region, not necessarily at proposed sites; marginally useful					
3.5 kHz	Chirp & Boomer data provided, but not useful					
Bathymetry	Images (no grids or resolution info)					
Backscatter	Raw data (plot I generated looks good, but not very useful)					
Currents	Tide & current meter data not in SSDB => Still seeking access to current data					
Samples	Site 831 appropriate? Uploaded dredge locations					

Data Requirements

Bougainville Guyot

Site	Bathy (m)	Penetration (m)
BG-5A	1400	150
BG-4B	750	150
BG-3B	875	150
BG-2B	950	150
BG-1B	1050	150



	BG-1B	BG-2B	BG-3B	BG-4B	BG-5A
Seismic (acq & proc?)	L5SP84 (no x-ing) CDP 790	L5SP84 (no x-ing) CDP 820	L5SP84 (no x-ing) CDP 851	L5SP84 (no x-ing) 885, 1 km offset	L5SP84 (no x-ing) CDP 718
Seismic Vel.	Assume 2 km/s				
MCS grid	Necessary? No.				
3.5 kHz	Pre-deployment survey?				
Bathymetry	Raw data (old Seabeam nav. not merged) & ASCII table Unable to improve				
Backscatter	None				
Samples	Site 831				
Video/photos	Acquire prior to MeBo deployment?				

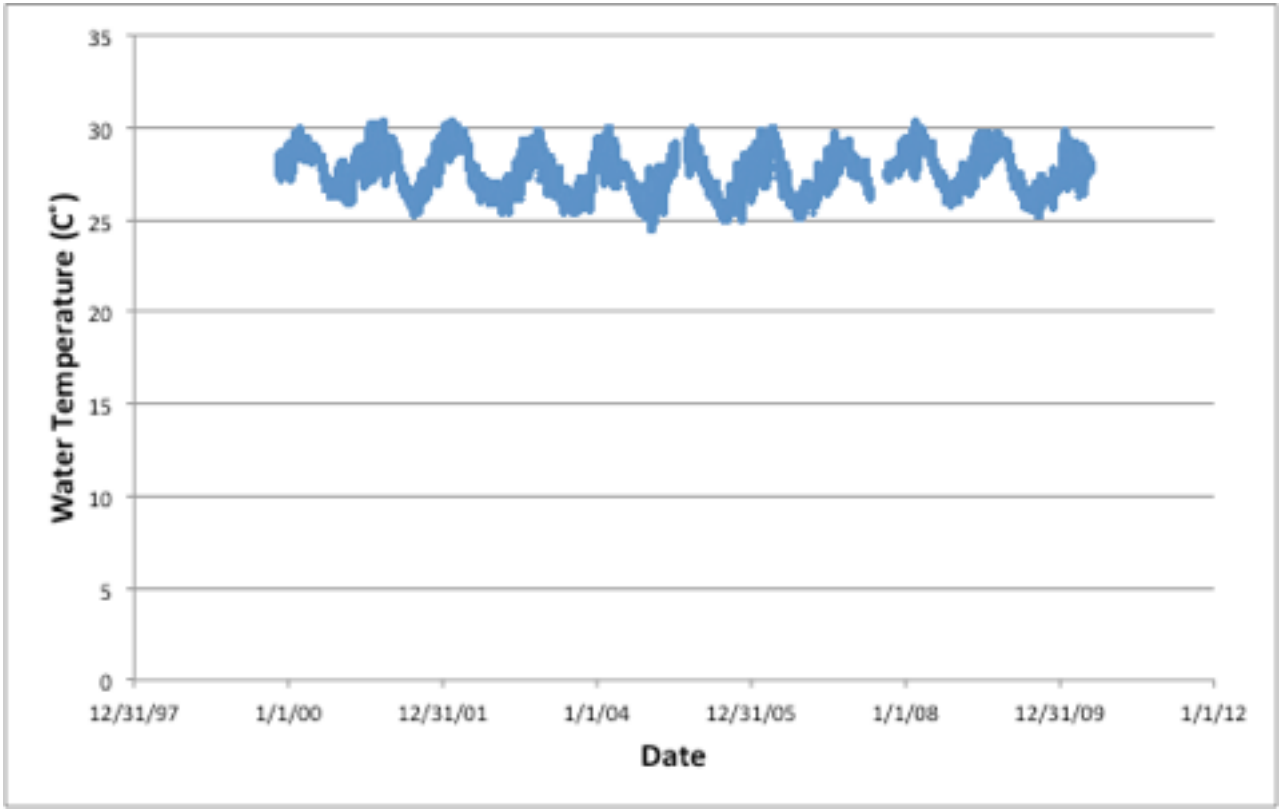
Issues requiring follow-up

1. SEG-Y data are missing for Line SB-24. We are not able to evaluate the interpretation in detail.
2. The reprocessed seismic line L5-SP84-100 on BG includes a section that is over-migrated, so the physical character of the subsurface is obscured at proposed site BG-5A.
3. CDP or SP positions are not indicated on Form 2.
4. No legend is provided on Site Summary Form to explain interpreted reflectors.
5. Acquisition and processing parameters are not provided for L5-SP85-100 and L5-SP85-106. The data watchdogs were particularly concerned with the reprocessing parameters for the new migrations (see number 2, above).
6. We noted many problems with the SEGY header values for the reprocessed L5- SP85-100 and L5-SP85-106 lines: e.g., negative trace numbers, no x and y coordinates. For guiding the drilling, it is very important that these headers be corrected, and that the SSDB contain corrected SEGY data.

SEP Conclusion: Data are sufficient to forward to EFB, but there are some missing data and some data with navigation/processing issues that should be addressed by proponents.

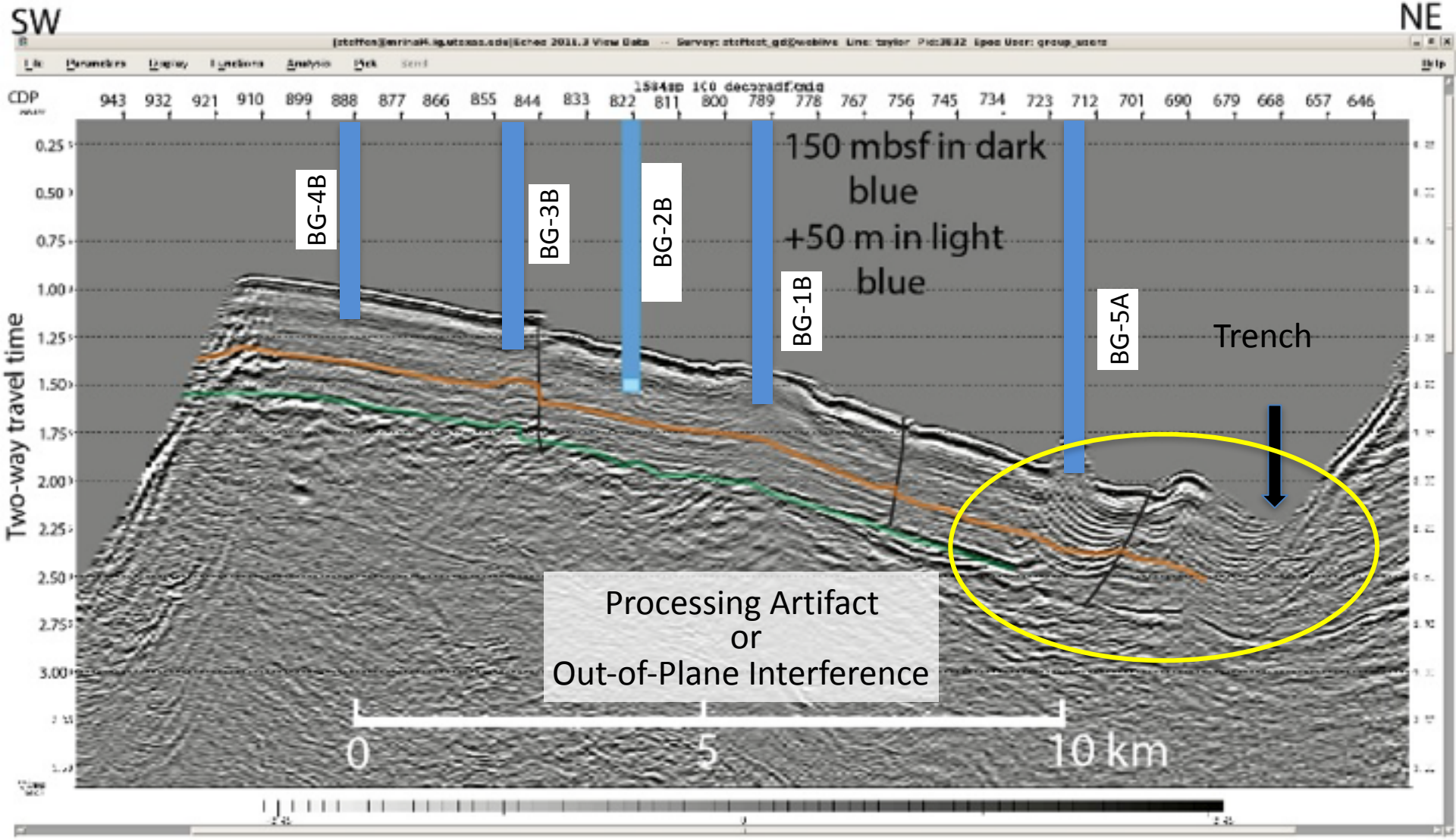
There are some proposed sites that do not have crossing MCS lines or are not imaged at all by MCS data; however, SEP agrees that these issues are not sufficient to hold back the proposal. Additional high-res multibeam data and video may be required at the time of deployment to adequately position MeBo200.

Environmental and Water Column Data (T, Sal, Pressure)



Bougainville Guyot

Site BG-5A => patch reef? (more likely to contain coral heads than lagoonal sites).



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Form & SSDB Issues

Form 2
- Check whether CDP or SP indicators

Form 6 Incomplete
- Provide legend for colored reflectors

Seismic Data Acquisition & Processing Info.
- Bougainville (reprocessed 1984 SP Lee MCS)
- Response to Reviewers indicates it was uploaded, but I can't locate
- Seismic grid (SB1-SB44?), Line SB-24?

Location of BG-5A
- Processing artifacts
- Risk/Reward of Patch Reef?

Site Classification & Characterization

Sabine Bank

Site	Sensu Stricto Status	**SEP Status**	Major Issue(s)	Minor Issue(s)
SAB-1B	2 3	1 2		No crossing lines Multibeam Data (no grids or resolution info) Tide & current data to be submitted (ADCP?)
SAB-2B	2 3	1 2		
SAB-3B	2 3	1 2		
SAB-4B	4	2	Closest MCS 150 m away	
SAB-5A	4	2	Closest MCS 250 m away	
SAB-6A			Closest MCS 450 m away	

IODP

Site Classification & Characterization

Bougainville Guyot

Site	Sensu Stricto Status	**SEP Status**	Major Issue(s)	Minor Issue(s)
BG-1B	2 3	1		No crossing lines MCS Acquisition & Processing Information
BG-2B	2 3	1		Multibeam Data (not merged with nav.)
BG-3B	2 3	1		Check CDP information on Form 2
BG-4B	2 3	1		
BG-5A	2 3	2 3	MCS Processing Issue?	

IODP

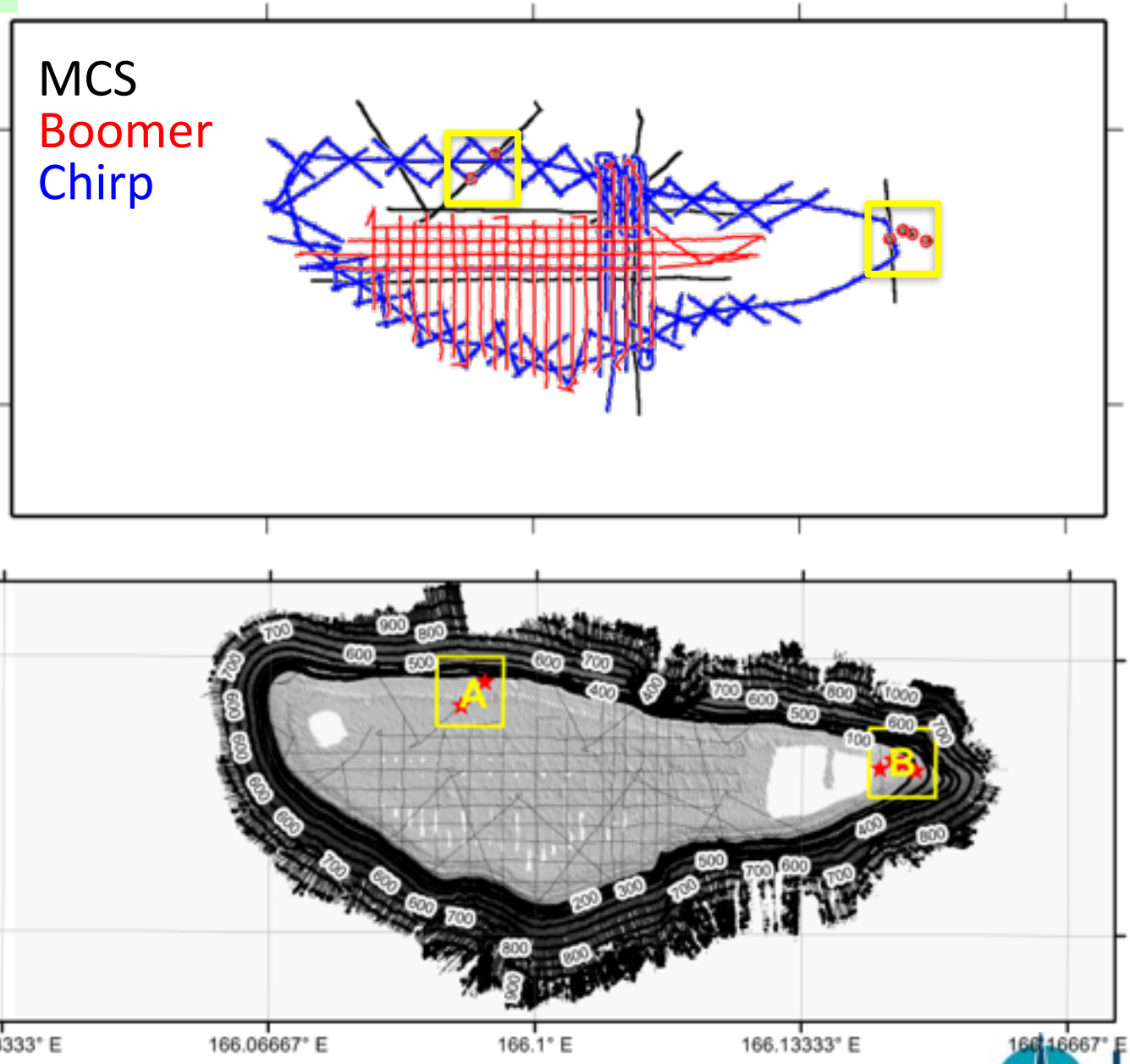
Recommendations

Summary

- Mostly minor data issues
- How important are current data and multibeam for approval?
- Is there seismic acquisition/processing information for BG?
  - Site BG-5A processing issue
- Are there still temperature concerns for MeBo in 25 to 30 C˚ water?
- Any overarching safety issues?

- ❑ **Deactivate**
- ❑ **Holding Bin**
- ❑ **EFB**

Sabine Bank


MCS
Boomer
Chirp
A
B
15.93333° S
15.96667° S
166.03333° E
166.06667° E
166.1° E
166.13333° E

Sabine Bank

730-Full2 - Taylor