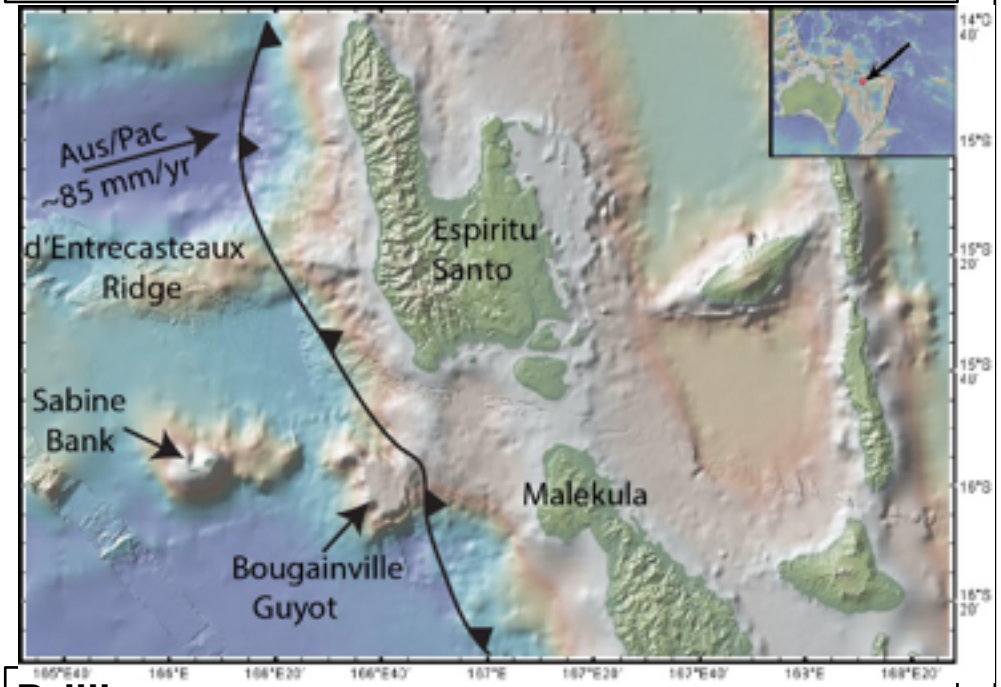
MSP 730-Full2: Sabine Bank Sea Level (Taylor)

IODP Theme: Climate and Oceans

Region: Southwest Pacific (Greece)



Drilling:

- 11 primary sites, 26-1400 m WD, **150 m** penetration depths
- MeBo 200

Objectives:

Overall objective to recover corals of many ages to:

1. Response of ENSO to global climate
2. Relationship between sea surface salinity and temperature and ENSO
3. Has the South Pacific Convergence Zone been the dominant control on seasonal rainfall?
4. Was MIS 11 sea level 20-40 m higher than present.
5. Determine the paleo-vertical and -horizontal motions Sabine Bank and Bouganville Guyot

History & Current status at EFB:

730 Pre 2009,

730 Full 2014,

730 Full2 2015, reviewed 2016

>>> Waiting Room 2016

Proposed Sites

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
BG-5A	-15.99494, 166.70881	1400	150	0	150	Maximum recovery of coral reef sediments to depth of coring.
BG-4B	-16.038149, 166.631337	750	150	0	150	Maximum recovery of coral reef sediment.
BG-3B	-16.03545, 166.65048	875	150	0	150	Maximum recovery of coral reef sediments
BG-2B	-16.02635, 166.66424	950	150	0	150	Maximum recovery of coral reef sediments to 150 m
BG-1B	-16.01715, 166.67747	1050	150	0	150	Maximum recovery of corals
SAB-6A	-15.946667, 166.147500	110	150	0	150	Maximum recovery of corals and reef sediment.
SAB-5A	-15.945833, 166.145833	95	150	0	150	Maximum recovery of coral reef rock and sediments.
SAB-4B	-15.945375, 166.144583	70	150	0	150	Maximum recovery of corals and reef sediments
SAB-3B	-15.946453, 166.143010	26	150	0	150	Drill for maximum recovery of coral reef to ~150 m depending on condition of material recovered.

• How did climate vary on annual, interannual (i.e. ENSO), and decadal timescales in the Western Pacific Warm Pool and how did climate respond to changes in global climate boundary conditions and radiative forcing and during abrupt climate changes?

• Could **ENSO variability or multi-decadal variability** have been different during **MIS 11** or 5e when climate was warmer and sea level higher than today?

• What is the relationship between SSS, SST and ENSO in Vanuatu under changing boundary conditions and radiative forcing over the long intervals BG and SB represent?

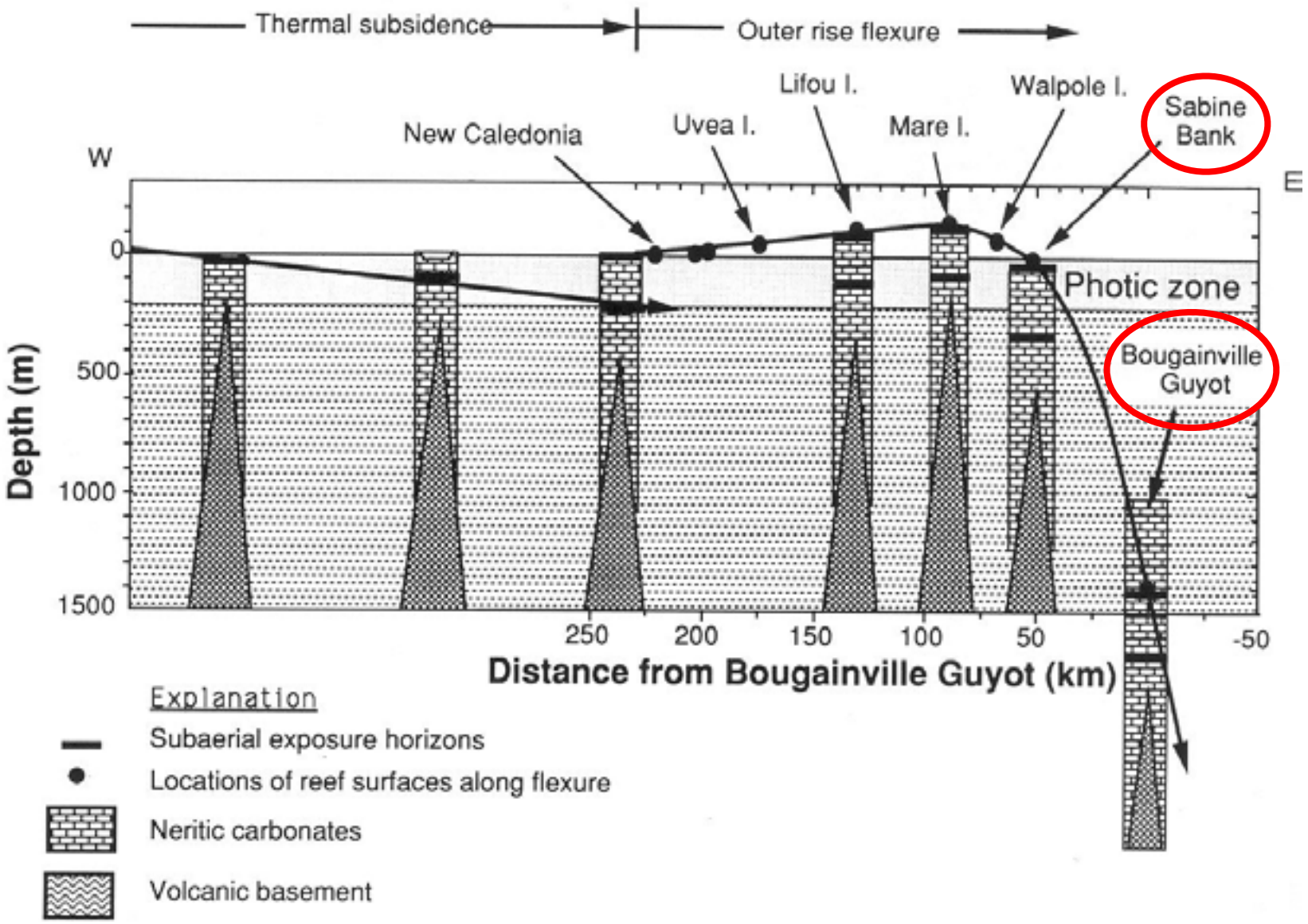
• How did **the South Pacific Convergence Zone (SPCZ)** respond to different global climate boundary conditions, abrupt climate changes and changes in radiative forcing?

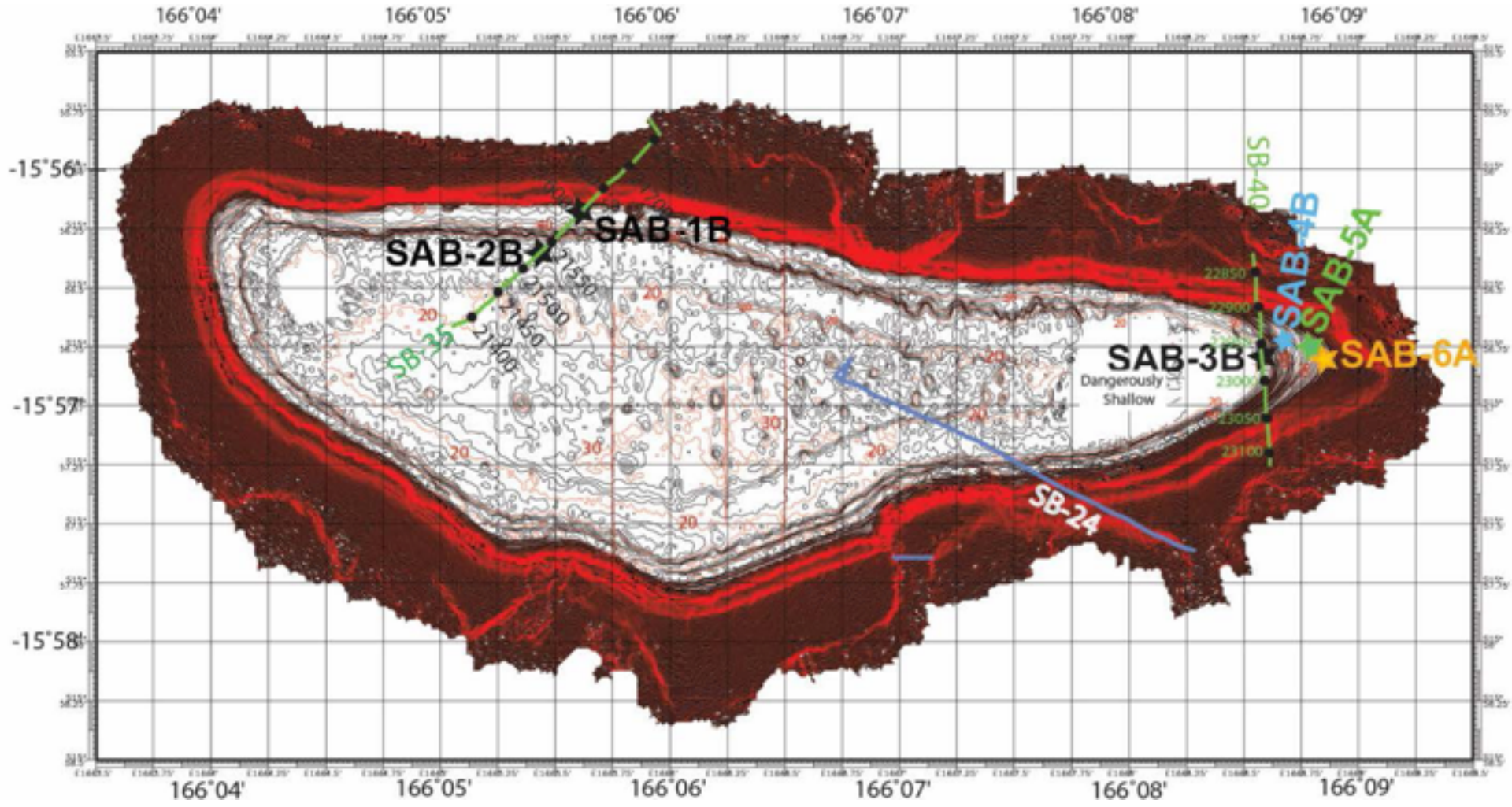
• How well did BG keep up with relative **sea level rise and fluctuations**? Was the ocean unusually cool or salty?

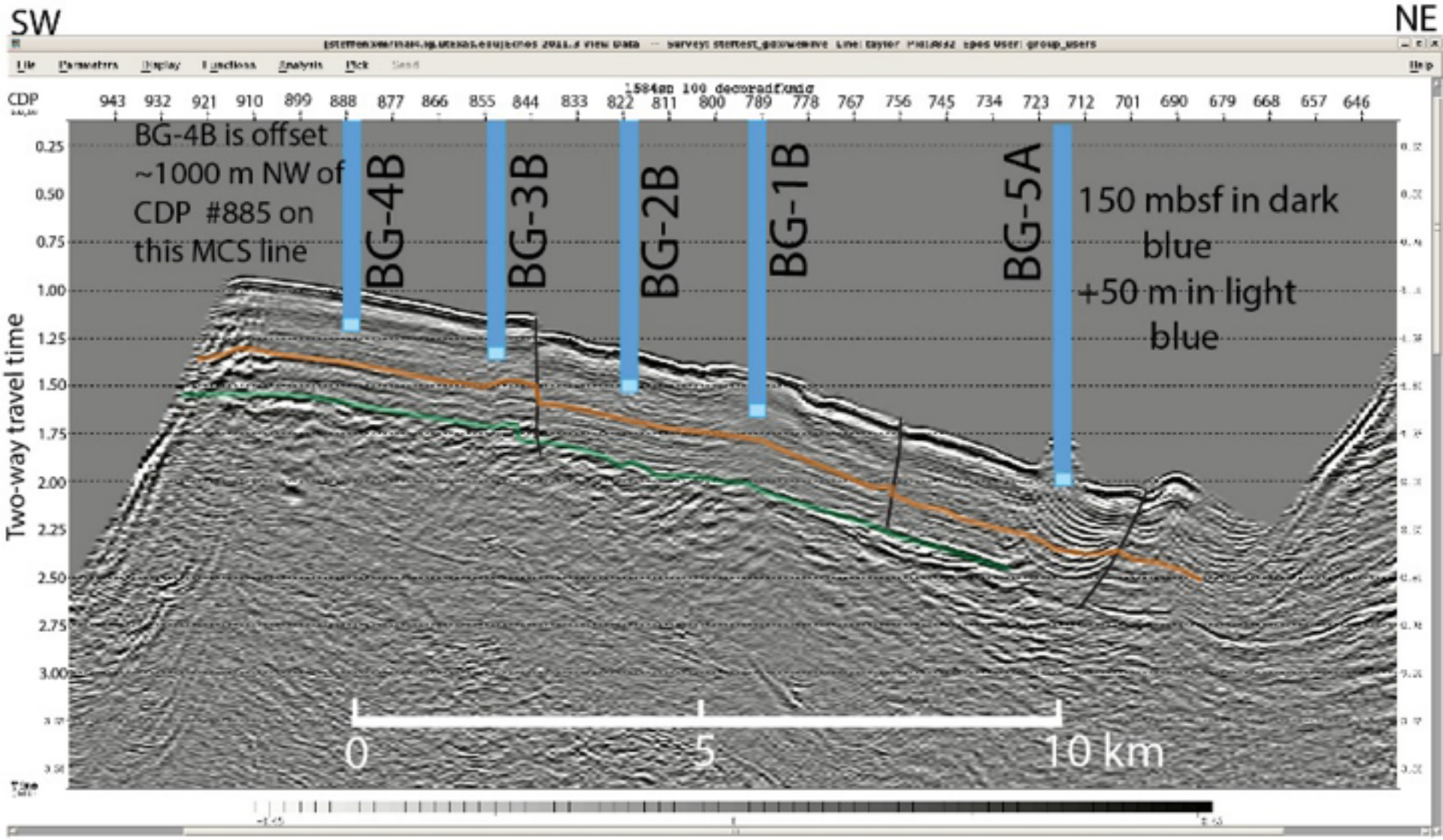
• Was **Vanuatu's Kuwae volcano** the source for the 1452 AD second largest volcanic eruption of the past 1500 yr and were there previous great eruptions?

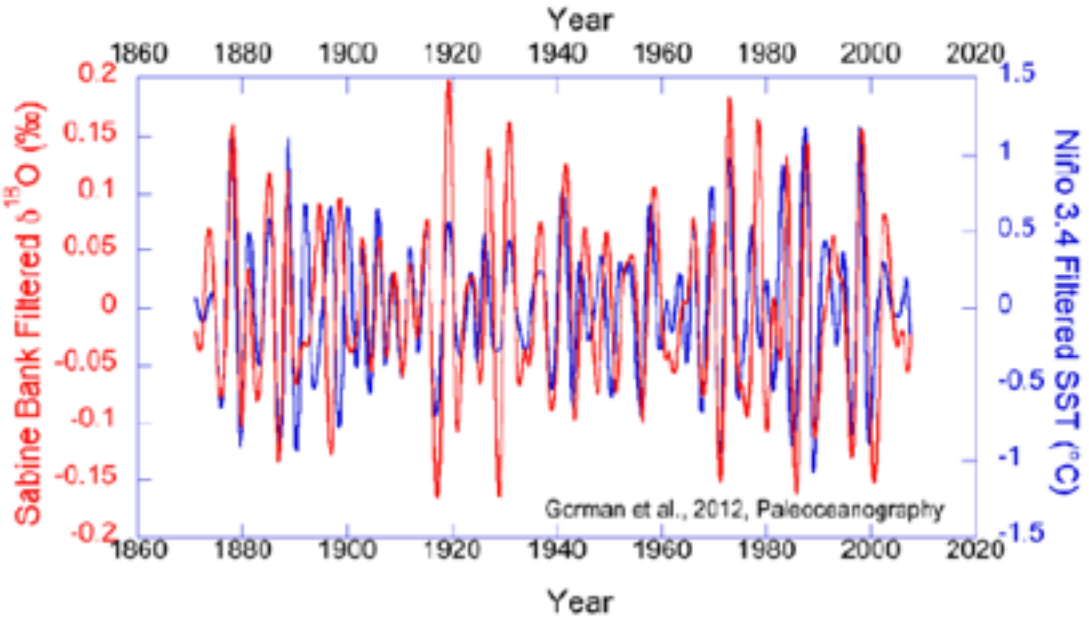
• What is the oceanic paleoclimate near BG over the past 100-200 ky for **comparison to existing and developing speleothem and coral records** from nearby islands

• Was the descent of the early to mid-Tertiary Australian plate into the mantle steady and independent of N**ew Hebrides forearc tectonics** or was the process more complex?


Thermal subsidence
Outer rise flexure
New Caledonia
Uvea I.
Lifou I.
Mare I.
Walpole I.
Sabine Bank
W
E
0
500
1000
1500
Depth (m)
Photic zone
Bougainville Guyot
250
200
150
100
50
-50
Distance from Bougainville Guyot (km)
Explanation
Subaerial exposure horizons
Locations of reef surfaces along flexure
Neritic carbonates
Volcanic basement


166°04'
166°05'
166°06'
166°07'
166°08'
166°09'
-15°56'
-15°57'
-15°58'
SAB-1B
SAB-2B
SB-35
SB-40
SAB-4B
SAB-5A
SAB-6A
SAB-3B
Dangerously
Shallow
SB-24
22850
22900
23000
23050
23100
21550
21500
21450
21400
20
30


SW
NE
CDP
943 932 921 910 899 888 877 866 855 844 833 822 811 800 789 778 767 756 745 734 723 712 701 690 679 668 657 646
BG-4B is offset ~1000 m NW of CDP #885 on this MCS line
BG-4B
BG-3B
BG-2B
BG-1B
BG-5A
150 mbsf in dark blue
+50 m in light blue
Two-way travel time
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
0
5
10 km



2005). But how does the downgoing plate respond to deformation and eastward retreat of the forearc? Such potentially detailed tectonic behavior of a subducting plate has never been captured anywhere before.

Fig. 5. Filtered $\delta^{18}O$ data (red) from live Sabine Bank Porites lutea coral vs. NIÑO3.4 Index (blue) shows strong correlation throughout record (Gorman et al., 2012) and that central New Hebrides corals capture Pacific-wide ENSO climate variability. 5b. Porites head at ~8 m depth on western SB. Deeper areas have branching corals and more debris.