

VOYAGE PLAN
RV SOUTHERN SURVEYOR
SSTransit 02/2006

Title

Establishing geochemical tracers for paleoceanographic reconstructions in the western Pacific

Itinerary

At this time the voyage is planned to be:

Depart Noumea:	16:00	11/09/06	Longitude 166.45 deg E	Latitude 22.27 deg S
Arrive Sydney	13:00	17/09/06	Longitude 151.21 deg E	Latitude 33.87 deg S

Principal Investigator

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Scientific Objectives

We attempt to test the oceanographic model for the western Pacific region by looking at a range of tracers from surface sediments from different water depths in the same region. This will allow validation of some of these tracers, allowing better calibration when applied down core. This work is important for future work we are planning to carry out in the tropical and subtropical Pacific region as part of an application for the use of the Southern Surveyor in 2007-2008. The results are further important for the interpretation of results from the analysis of sediment cores already collected in the Pacific region. A series of sediment samples from the Pacific Ocean will be collected along a transect from Noumea, New Caledonia to Sydney, and analysed for their foraminiferal assemblages and the geochemistry of these foraminifera. We will establish a latitudinal gradient of the foraminiferal assemblages, and the links to oceanographic conditions. We will further establish the link between the geochemistry of these foraminifera and oceanographic conditions. In addition to tracers of sea surface temperatures, salinities, and oxygen indices, we will include tracers of nutrient production. Based on the results we will also assess the validity of a range of tracers as indicators of changes in ventilation and circulation. As part of this project, we are further proposing to carry out a practical oceanography field course at Sea. This is a unique opportunity to expose students to modern day oceanography.

Voyage Objectives

We will test the oceanographic model for the region along the transect from Noumea, New Caledonia to Sydney. A series of sediment samples from the Pacific Ocean will be collected along the above transect and analysed for their foraminiferal assemblages and the geochemistry of these foraminifera. We will establish a latitudinal gradient of the foraminiferal assemblages, and the links to oceanographic conditions. We will further establish the link between the geochemistry of these foraminifera and oceanographic conditions. In addition to tracers of sea surface temperatures, salinities, and oxygen indices, we will include tracers of nutrient production. The link of each of these tracers to the oceanographic conditions derived from

hydrographic measurements will be studied, as well as the links between the above tracers. We will make use of oceanographic data available for the region, and, if time allows, carry out CTD sampling to complement these data. The main purpose of the CTD cast is, however, to educate the students on board with regard to the use of oceanographic equipment. We will make use of the sub-bottom profiler and swath mapper if training of their best use can be provided prior to the cruise.

Voyage Track

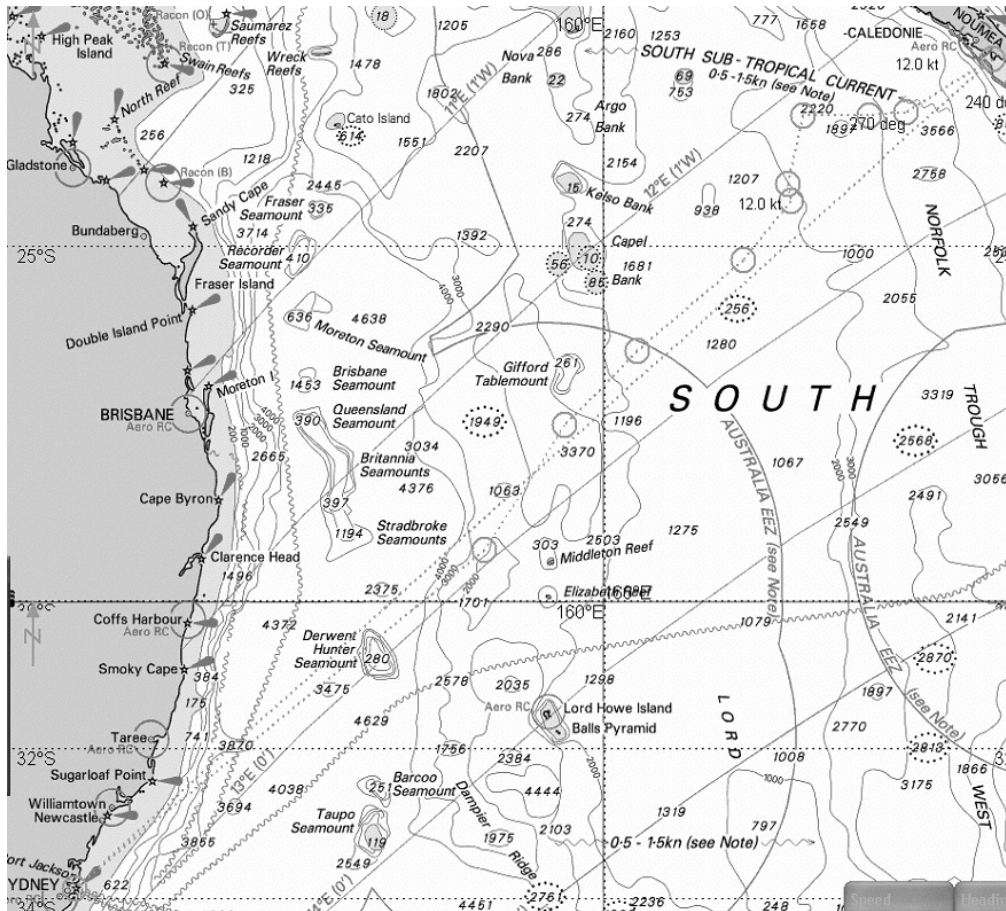


Figure 1: Proposed area of operation and voyage track (dotted grey line) including the sampling locations (open grey circles) of 6 to 9 sediment samples as well as a CTD cast.

APPROXIMATE SAMPLING SITES

Station #	Longitude deg E	Latitude deg S	Water depth (m)	Time at station
Start: Noumea	166.45	22.27		

PLANNED SEDIMENT SAMPLES:

1.	165.00	23.05	3550	2hr 30 min
2.	164.40	23.10	3000	2hr 10 min
3.	163.30	23.10	2200	1hr 45 min
4.	163.05	24.10	2000	1hr 36 min
5.	163.10	24.35	1673	1hr 26 min
6.	162.30	25.20	1068	1hr 6 min

Possible additional SEDIMENT SAMPLES:

7.	160.55	26.50	1564	1hr 22 min
8.	159.35	27.55	3370	2hr 22 min
9.	158.02	29.30	1704	1hr 27 min

End: Sydney 151.21 33.87

During the voyage we will continuously review the time table and the sampling program to ensure that the time frame of 6 days is met, even if any unforeseen circumstances should occur. The last three stations are only included if we have sufficient time. We could further exclude some of the stations, for example, 2, 4 and 6 if less time is available or if some of the time is needed for transect. However, the latter scenario seems unlikely. The above stations may be re-defined and moved slightly, depending on the sediment cover revealed by the swath bathymetry. The 3rd station may be adjusted from 2200 to 2500 m water depth, depending of the results of the swath mapping.

One CTD cast is planned at station 1. Samples will be taken from water depths at every 500-m interval at station 1, from 3500m, 3000m, 2500m, 2000m, 1500m, 1000m, 500m water depth and at the surface. The round trip for the CTD at 60m/min winch speed is about 2 hrs, and we allow an additional 30 minutes for preparation of sampling and retrieving the samples.

Time Estimates

At this time the voyage is planned to be:

Depart Noumea: 16:00 11/09/06 Longitude 166.45 deg E Latitude 22.27 deg S
Arrive Sydney 13:00 17/09/06 Longitude 151.21 deg E Latitude 33.87 deg S

The sampling program requires slight deviation from the original straight track of the transit voyage which did not consider any sampling. The deviation from the original track is shown below in Figure 1. Compared to the original transit voyage, the proposed sampling program requires an additional 48.3nm of steaming (Table 1). Compared to the original transit time, an additional 5 hours of steaming time are needed to account for the sampling program along the track. The additional distances needed between the stations and during the entire cruise, leading to the additional 5 hours of steaming time, are given in Table 1.

Station		Noumea	A	B	C	D	E	F	G	H	I	Sydney
		22° 27' S 166° 45' E	23° 05' S 165° 00' E	23° 10' S 164° 40' E	23° 10' S 163° 30' E	24° 10' S 163° 05' E	24° 35' S 163° 10' E	25° 20' S 162° 30' E	26° 50' S 160° 55' E	27° 55' S 159° 35' E	29° 30' S 158° 02' E	33° 87' S 151° 21' E
Noumea	22° 27' S 166° 45' E											
A	23° 05' S 165° 00' E	239.9	93.3									
B	23° 10' S 164° 40' E	245.4	124.5	264.9	33.4							
C	23° 10' S 163° 30' E	254.1	182.3	269.2	94.4	270.0	60.7					
D	24° 10' S 163° 05' E	239.8	216.2	239.7	124.9	231.2	95.9	193.0	61.6			
E	24° 35' S 163° 10' E	236.1	223.7	239.4	130.8	223.8	103.8	169.4	75.9	169.6	15.3	
F	25° 20' S 162° 30' E	232.5	288.9	229.1	196.8	222.5	171.0	203.6	137.5	211.9	77.8	220.7
G	26° 50' S 160° 55' E	231.9	411.7	229.7	319.8	225.9	293.4	216.4	253.6	223.4	198.3	227.1
H	27° 55' S 159° 35' E	230.8	501.2	228.8	409.6	225.9	383.5	218.9	343.0	224.1	288.5	226.7
I	29° 30' S 158° 02' E	227.3	622.3	225.2	532.2	222.9	507.4	217.5	469.0	222.6	413.2	222.6
Sydney	33° 87' S 151° 21' E	229.3	1067.1	228.3	976.5	227.2	950.9	224.7	909.1	228.8	855.7	227.6
	Additional Dist:	48.3										
												Total
												1115.5

Table 1: The table shows the additional distance of 48.3 nm (approximately 5 hrs of steaming) that are needed for the project compared to the straight transit cruise track. Included are sampling locations, and courses and distances between sampling locations. The sampling stations 1 to 9 are referred to as stations A to I.

Piggy-back Projects

N/A

Southern Surveyor Equipment

Smith MacIntyre grab.

Cool-room at a temperature of 2-4 deg C for storage of sediments.

Sub-bottom profiler, and some technical support, is desirable.

Post-cruise navigation data is required.

Some technical support for the swath mapper is required from the Marine National Facility. A precise and complete bathymetry is not needed for this project but we will use the swath data to target our sampling. The swath mapper will be applied prior to grab sampling if training of its best use is provided by Geoscience Australia prior to the cruise. We further attempt to receive such training for the sub-bottom profiler.

CTD, and support to use the CTD is desirable.

User Equipment

Conductivity meter and chemicals for water measurements

Several boxes of storage jars and bottles, storage containers (possibly liquid nitrogen)

Geoscience Australia Gravity Corer

Personnel List

Anne Mueller	UNSW	Chief Scientist
Moninya Roughan	UNSW	Scientist
Alessandro Gigante	UNSW	Student
Colette Kerry	UNSW	Student
Steven Portelli	UNSW	Student
Helen Macdonald	UNSW	Student
Christopher Hellyer	UNSW	Student
Tess Pritchard	UNSW	Student
Luke Hedge	UNSW	Student
Jacqueline Bell	Macquarie Uni	Student
Elizabeth Vu	UNSW	Student
Andrew Hislop	GA	Technical Support/SST
Andrea Cortese	GA	Swath Mapping Support
Stephen Thomas	CSIRO/MNF	Voyage Manager/Electronics Support/SST
Robert Beattie	CSIRO/MNF	Computing Support/SST

(UNSW = University of New South Wales; GA = Geoscience Australia; CSIRO = Commonwealth Scientific and Industrial Research Organisation; MNF = Marine National Facility; SST = System Support Technician;)

This voyage plan is in accordance with the directions of the National Facility Steering Committee for the Research Vessel Southern Surveyor.

Anne Müller