

voyageplan



SS02/2006

AUSCAN 2006 and PALAEO-MURRAYS: Geological and biological investigations of the Murray Canyons Group.

Itinerary

Depart: Port Lincoln, 1000hrs, Wednesday 1 March, 2006 Arrive: Hobart 0800, Wednesday 15 March, 2006.

Principal Investigator

Professor Patrick De Deckker (Chief Scientist) – Department of Earth and Marine Sciences, The Australian National University, Canberra ACT 0200 **Phone:** (02) 6125 2070 **Email:** patrick.dedeckker@anu.edu.au

Scientific Objectives

There are 2 principal objectives, plus 2 minor ones [one being listed as a piggy-back project].

The first objective is to study large holes that have been found during the AUSCAN 2003 cruise offshore the Murray Canyons Group offshore Kangaroo Island. These holes occur along possible tectonic lineaments from depths between 4,500 and 5,500 m. Water samples [for water chemistry and microbiology] and short cores will be taken in some of the holes in an attempt to determine their mode of formation.



The second objective is to determine, by means of swath mapping and sub-bottom profiling, the location of several of the ancient meanders of the River Murray that would have been formed during periods of low sea level on the very broad Lacepede Shelf. An attempt will be made to link the meanders with the heads of the various canyons of the Murray Canyons Group, and determine if 'erosion' is currently active at those locations. Short cores will be taken on the Lacepede Shelf in an attempt to find a high-resolution Holocene record of fluvial outwash of the Murray. CTD measurements will be taken along some of the meanders to determine whether they act as conduits of continental, fresh waters.

A minor objective is to follow and map in several places the low sealevel stand that occurred 20,000 years ago and dredge wherever possible suitable material for dating and geochemical analysis.

Voyage Objectives

During the first part of the voyage, from Port Lincoln to station 10, we will track ancient river meanders in the southern end of both Spencer Gulf and Gulf St Vincent [Investigator Strait] as well as follow the 120-125 m contour line to identify the nature of the last glacial maximum low-sea level stand.

After that we will travel over the du Couëdic Canyon, starting at this 'head' down to the abyss, and the same is panned for the Sprigg Canyon. Once the deeply-located holes have been swath-mapped in parallel with data on their sub-bottom profiles, water samples anc short cores will be taken in 4 selected holes. These investigations will be performed between stations 11 and 29. A core is to be taken at the site [MD2611] where a core was taken in 2003 during the AUSAN cruise.

During the rest of the voyage, the Lacepede Shelf will be mapped using principally the sub-bottom profiling system and partially the swath mapper to determine the location of ancient meanders of the River Murray [stations 30 to 45] and the Onkaparinga River [between stations 38 and 43]. Once this is achieved, the locations of transects 34 to 46 [located near the mouth of the River Murray] to 47 to 48 back to 36 will be decided and it is during this period that shallow cores, grab and CTD samples will be taken.

Following from these investigations, transfer between stations 36 and 49 will attempt to follow the 125m contour line and pass over several heads of canyons, including the Bridgeport Canyon. At station 49, located at 1000m, we are to track the possible canyon that ought to occur offshore the Glenelg River, which is thought to have been an ancient course of the River Murray. Upon reaching the 50m contour line, the ship is to then steam to Hobart where the voyage is to end.





AUSCAN 2 & PALAEO-MURRAYS SS-02/06S

latitude	longitude	station	task to be performed	eason	distance	extende	ravel	coring CTD	Macintyre	dredging	plankton
		.ou			travelled in nautical minutes	d travel t	ime in nours	time time (h) (h)	grab sampling	time	tows
					*		**		time		
34°44.7'S	135°52.54'E 126°02'E		Departure Port Lincoln		0 5		0				
35 02 5	136°14.5'E	4 m -	pass offshore Thistle Island	check sea filor ~50m	26.5		4.				
35°05'5	136°27'E 135°56'E	4 2	pass offshore Gambier Islands Ir	map river courses in Spencer G.	35						
35°32'S	136°11.5'E	9	follow 100-120m contour	map ancient river courses	22		0.0				
35°31.5'S	136°19'E	7	follow 100-120m contour	ap ancient river courses	8		0.7				
35°42'S	136°31.7'E		follow 120m contour offshore Cape Bor	da	18		9.9				
36°20'S	130 20.2 L	10	aim for head of du Couëdic Canvon		33		0.0				
36°24.7'S	136°11.5'E	1	follow head of du Couëdic Canyon		5.5		0.5				
36'39.5'5	136°21'E 136°23'E	12	follow top of du Couëdic Canyon and s	wath map un-mapped area from Auscan cruise, CTD	17		vi c		-		
36 41 5 36 44 S	136°44'E	14	cross the canyon and map hoor using swath map previously un-mapped are:	sub-pottom promer a as for 12	5		0.5				
36°36'S	136°45'E	14a	idem		œ		0.7				
36°26.7'S	136°43'E	14b	idem		10		6.0	-			
36.40.5'5	136-43'5 136°35 7'F	15	reach aussan core site MD2611(W of A	hirrav Canvon): take short core + CTD			5	6	0		
36°54'S	136°34.5'E	16	swath map new area ✓ for deep	hole	6.5		0.6	4	4		
36°57.8'S	136°33'E	17	survey hole @4700m and do the same	for all holes until Station 21	4		.4				
37°09.5'S	136°30.7'E	21	ha ving done this return to St.17 and or	the way core 2/ 3 holes+take 2/3 CTD	11.5	21 to 17	0.	80	8	4	
36°59.7'S	136°32.3'E	18	see note above								
27°06'S	136 32 E 136°31 3'F	20	idem note denth at St 21 is ~5 050m								
37°04.5'S	136°40.5'E	22	flat platform: good for a core		12.5		-	m			
37°04.7'S	136°11.5'E	23	go across to Sprigg Canyon and then I	proceed to St.28 to survey holes	21.5		0.0				
21510.75	136°50'E	ac	once arrived decide which hole to core	(2 or 3) dradre and take CTD-St 28 @ 5350m ***	35	26 04 80	~	10	0	4	
27°183'5	136°49 7'F	27		י (ד סו היי מורמפר מומ ומצר רומי הרדים די מש החחסוו	64	C7 01 07	2	2	>		
37°16'S	136°51.7'E	26	depth possibly at 5300m								
37°14'S	136°52.7'E	25	de pth @5150m								
37°10'S	136°55.7'E	24	de pth @5000m		36			+			
C /.6C DC	J C.20 /CI	27			C7	dento	0				
						st					
						30:392					
36°51'S	137°29'E	30	turn East and follow previous swath tra	ck until 120m contour; find head of canyons &qullies'	20	minutes	Ø				
36°57'S	138 °E	31	map sea floor with swath mapper+ sub	o-bottom profiler; check for sediments & ancient mear	40	,	3.6				
36°13.95'5	137°E	32	idem these will be for ancient Murray co	Durses	108		8.0				
2 C C C C L 1 2 C C C C C C C C C C C C C C C C C C	13/ 30.5UE 138°F	25	idem idem		40 65		0.0				
37°5	138°F	35	idem		32		6				
37°S	139°E	36	idem		83		.5				
36°04.07'S	137°43.48'E	37	idem		142		2.9				
35°57.68'S	138°E	38	idem	-	25		0.3				
37"5	139°21.74'E	39	idem & check for palaeo-Coorong corri	dors; if one depression found, consider coring it	153 JE		3.9	0.5			
35°48.38'S	138 23.91'E	41	idem		160		4.5				
35 57.68'5	138 °E	38	check for Onkaparinga ancient course	s and continue mapping sea floor	38		3.5				
35°51.28'5	138°34.78'E	42	same as above in 38		49	1	1.5				
35-41.40'S	138 44.93 E	43	same as above in 38		22		0. 1	ł			
36°06.40'5	139°29.71'E	45	idem & check for palaeo-Coorong corris	dors: if one depression found, consider corina it	36		0.00	0.5			
36°41.86'S	138°E	34	same as staated in 31, plus chack pala	eo-Coorongs	137		2.5				
35°42'S	138°52.90'E	46	head for Murray mouth having decided	where to core and take CTD in depressions	120	for 34 to	6.0	2X0.5 2X0.5	2X0.5	4X 0.5	
approx. 36 23'S	approx.137°44'	4/	same comments as above but head S	W having selected best sites	120	for 46 tp -	0.0	2X0.5 2X0.5	2X0.5	4X 0.5	
36°41.86'S	138°F	34	same comments as above but head S	W having selected best sites	approx. 80	for 48 to	0 m	C-0 V7 C-0 V7	C-0 < 7	42.0.5	
37°S	139°E	36	tra vel towa rds Glenelg Canyon at 1000	m, but before follow the 120m contour line & map sea	55	for 34 to	0.9				
approx.38°40	approx.140°55'	49	once found the Glenelg Canyon proce	ed N and map it using swath & sub-bottom profiler	120	for 36 to	0.9				
approx.38	approx.141 E	50 Portland	possibly return S zigzagging across ca Arrival	nyon while using sub-bottom profiler; then head for P i	approx 30 approx 70	for 50 to 6	4				
					0		203.7h	27h 24h	Зh	13h	equiv of
							equal				2 hours
						~	s,s days				cruise
* assuming a co	onstant spped o	f11 knots J	per hour			total 2	72.7 1	1000000 = 1	1.4 DAYS	(check	(***)

TOTAL TIME OF CRUISE: 11.6 DAYS

 $\overset{\hbox{\scriptsize\scriptsize\scriptsize\scriptsize\scriptsize}}{\hbox{\scriptsize\scriptsize\scriptsize}}$ if we only core and take CTD in 4 holes instead of 5, we will save 8 hours

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Station List

Piggy-back Projects

Title: the geochemical and biological nature of aerosols offshore South Australia.

We will filter air during the entire voyage to determine the nature of aerosols by placing an air-filtering pump at the front of the ship. The filtered samples will be studied for their mineral, geochemical and microbiological contents. The air will be continuously filtered and this is not to affect any of the ship's activities. P. De Deckker is the investigator for this project.

Title: the collection of plankton and surface waters at sporadic times during the cruise.

We will collect samples of plankton at selected sites during the voyage, mostly when the ship is stopped for coring or other activities, by towing a net below the sea surface for approximately 10 minutes at a speed of 1 knot. The total amount of time spent for those tows is estimated to total 2 hours. Chemical analyses of water samples taken at the same time are to be performed by the CSIRO hydrochemist. P. De Deckker and S. M. Eggins are the investigators for this project.

Southern Surveyor Equipment

- CTD (Seabird SBE 911 plus) Rosette (24 bottles 10 litres) Fluorometer Sea Surface Temperature and Salinity Salinity Analysis Oxygen Analysis Nitrate Analysis
- Silicate Analysis Phosphate Analysis Milli-Q water supply Small Epibenthic Sled Smith-McIntyre sediment grab Swath mapper Sub-bottom profiler

User Equipment

6m Gravity Core and deployment system All the necessary consumables to be used with the gravity corer All equipment necessary for water plankton collection, including plankton net

Personnel List

Patrick De Deckker	ANU	Chief Scientist
Chris von der Borch	Flinders University	Sedimentologist
Peter Hill	ANU	Sedimentologist
ТВС		Sedimentologist
Stephen Eggins	ANU	Geochemist
John Rodgers	ANU	Micropalaeontologist, PhD student
Sarah Tynan	ANU	Sedimentologist, PhD student
Daniel Wilkins	ANU	Sedimentologist, PhD student
Doreen Rössler	LIOW	Sedimentologist, PhD student
Nigel Craddy	ANU	Technician
Michele Spinoccia	GA	Swath mapping support
Don McKenzie	CMAR	MNF Voyage Manager
Mark Rayner	CMAR	MNF Hydrochemistry support (SST)
Lindsay MacDonald	CMAR	MNF Electronics support (SST)
Bernadette Heaney	CMAR	MNF Computing support (SST)

ANU – Australian National University; LIOW - Leibniz Institut für Ostseeforschung Warnemünde; GA – Geoscience Australia; CMAR – CSIRO Marine and Atmospheric; MNF – Marine National Facility; SST – Systems Support Technician

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

Patrick De Deckker Chief Scientist