FRANKLIN

National Facility
Oceanographic Research Vessel

Water Chemistry and Sediment Mineralogy off the Great Barrier Reef

CRUISE SUMMARY

ORV FRANKLIN

FR 01/97

Depart Cairns	Thursday January 9 1997
Arrive Sydney	Thursday 23 January 1997

Principal Investigator

Dr Bradley N. Opdyke
The Australian National University

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WATER CHEMISTRY AND SEDIMENT MINERALOGY OFF THE GREAT BARRIER REEF

CRUISE REPORT FR 01/97

Sail: Cairns, QLD 1000 hours Thursday, Jan. 9, 1997
Dock: Sydney, NSW 0830 hours Thursday, Jan. 23, 1997

CHIEF INVESTIGATOR

Dr. Bradley N. Opdyke

The Australian National University

Scientific Objectives:

Two scientific objectives were set out in the initial cruise plan:

1) Search for geochemical signals for shallow water sediment dissolution off the GBR.

2) Gravity core for Paleoceanographic research and sedimentary response to changing carbonate saturation state of the sea water with depth.

These additional objectives were added after the Cruise plan was published:

3) Core the GBR lagoon off the Whitsundays where geophysical modelling of the post-glacial sea level rise predicts lacustrine sediment deposition (a paleo-lake about 11,000 bp)

4) Provide a unique educational experience to as many students as I could bring along on this cruise.

Outcomes:

Adequate core and water samples were obtained to accomplish all the above objectives. Coring transects were completed off the northern, central and southern GBR and south to the Lord Howe Rise (Figure 1). The main idea being that we should be able to track where shallow water (neritic) sediments are transported and dissolved around the GBR. Neritic sediments in this region are dominantly made up of the mineral aragonite. Aragonite typically dissolves in waters deeper than 1200m. Cores were taken to investigate the mineralogy preserved in the sediments, and water samples collected to look for a geochemical 'fingerprint' of dissolution. the most complete study location is in the southern GBR (Capricorn Channel), where we recovered samples from 200m to 3000m water depth at 500m intervals. This will cover in detail the depth range over which one can expect aragonite dissolution to occur, from close to the GBR to more distal, deeper locations. Sampling transects were also conducted off the reefs of the Queensland Plateau to study and compare a similar sedimentation and geochemical dynamic to the GBR, farther from terrestrial sediment and riverine influences.

In order to test the hypothesis of a paleo-lake off the Whitsundays we did succeed in recovering a shallow (66m) core from the within the area in question. Distinguishing whether these sediments are marine or lacustrine should be relatively straight forward and can be done soon after we return to Canberra.

The final leg of this voyage was aimed at collecting a series of cores for Paleoclimate-Paleoceanographic work along the Lord Howe Rise (approximately 160°E), in a Latitude transect from 24°S to nearly 32°S at Lord Howe Island. Unfortunately, by this point in the cruise we were pressed for time and missed recovering a core in the centre of the N-S transect. However, cores were obtained at both the northern and southern ends of the study area and should prove satisfactory to complete the study.

A total of 10 Grabs, 15 CTDs, and 19 Gravity Cores were successfully recovered (see the attached table).

The cruise was not without its drama. A few days into the cruise, both the starboard winches and the A-frame started experiencing control difficulties, to the point it was unsafe to operate them. There were some tense hours where it looked as if the CTD winch would be out of action for the duration of the voyage, however, the engineers isolated the hydrographic winch (which was out of action for the rest of the trip) and switched over to the towing winch motor, which allowed us to continue to operate the CTD. We owe the Chief Engineer, Paul Evans, many thanks for getting things running relatively smoothly again.

The Master, Neil Cheshire, has a reputation for being extremely cautious. When Neil did raise concerns, I found them well thought out and reasonable. We had one incident where a student came down with hives as a result of an allergic reaction. I found Neil handled the situation with grace and good humour. The mates, Ian and Doug, carried out their duties with a typically high level of competence and were good company on the bridge.

The crew did well, especially considering this group was relatively inexperienced in driving the winches, compared to the 3 previous groups I'd been out with (on the Franklin) this past year. There was one incident which happened at 3am one morning where the towing winch driver almost brought the coring assembly through the A-frame and bent the top of the corer. It was soon fixed, so no permanent damage. Additionally, I brought along a large number of undergraduate students. The crew should be commended for their patience with the students occasional displays of youthful exuberance.

Neil White and Erik Madsen displayed the typical competence and good cheer (most of the time) I've come to expect with the CSIRO ORV staff. Our hydro-chemist showed keen managerial skills in training the students to sample the CTD waters.

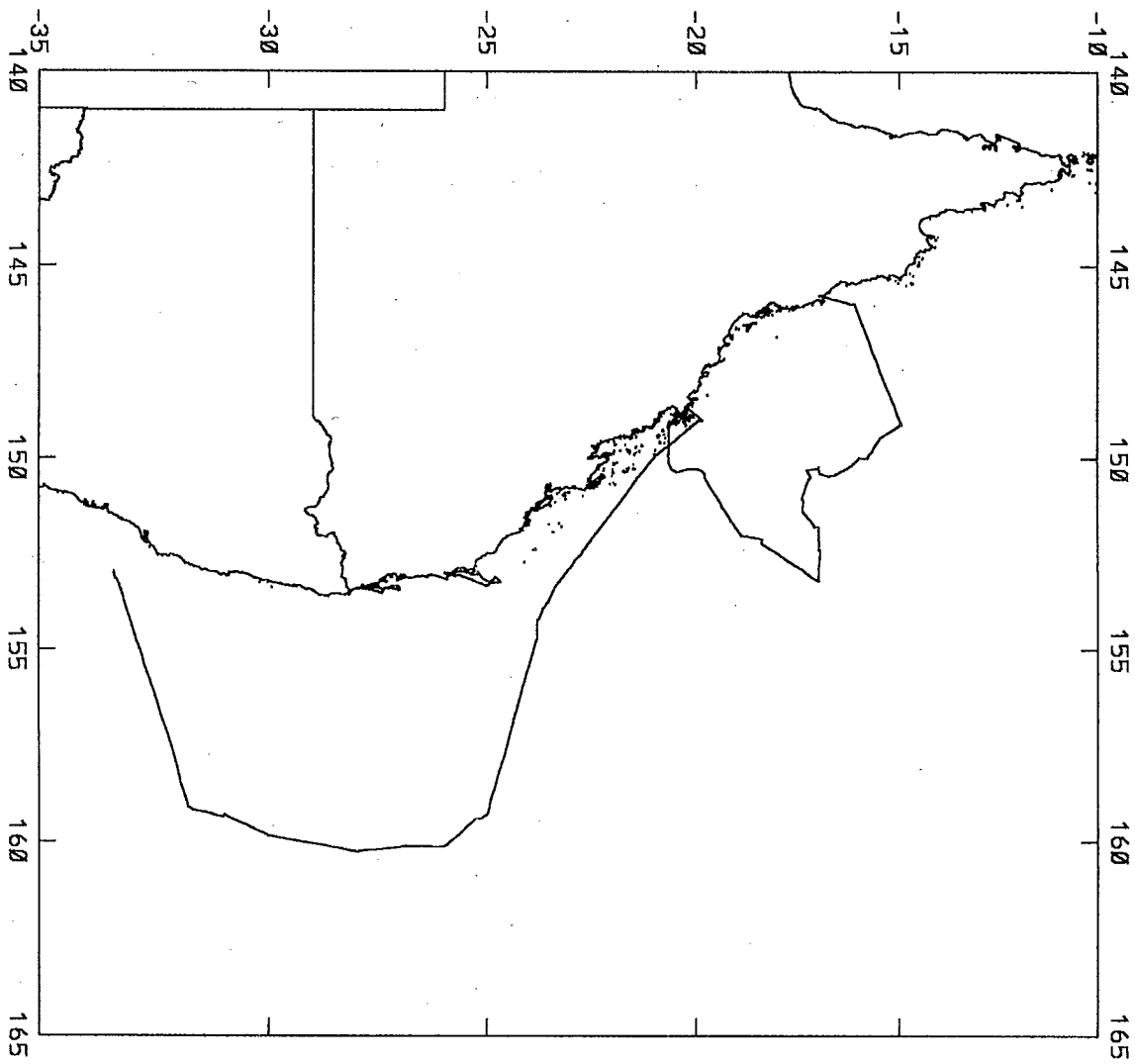
Finally, I have to end this cruise report on a sour note, because the cruise ended in an odd fashion. When the voyage began I thought it was strange that the hold was still full of material from the previous cruise. I'm sure many of the marine scientists doing research on the Franklin would be interested that she offers a cargo service. This was a small inconvenience, though there was barely space to store our few boxes. When we arrived in Sydney, I was presented with a *fait accompli* , this being that the previous cruises gear would be unloaded first, then ours. There was no discussion. I found this surprising given that, arguably, the extra material shouldn't have been on board in the first place. So my crew had to set around and wait for this other cargo to be unloaded. The whole operation was remarkably callus and inconsiderate, in stark contrast to all the other interactions I've had with respect to the four Franklin cruises I've been involved with over the past year. It was a situation that could have been easily avoided and probably should be in the future.

Scientific Participants

Dr Bradley Opdyke	Chief Scientist	ANU
Ms Anne Muller		ANU
Mr Norm Fasier		ANU
Ms Natalie Kositcin		ANU
Ms Heather Catchpole		ANU
Mr James Van Daele		ANU
Mr Mike Holzapper		ANU
Mr David McPherson		ANU
Mr David Ryan		ANU
Dr Neil White	Cruise Manager	CSIRO - ORV
Mr Erik Madsen		CSIRO - ORV
Mr Mark Rayner		CSIRO - ORV

Ships Crew:

Capt Neil Cheshire	Master
Mr Ian Menzies	Chief Officer
Mr Doug Henderson	Second Mate
Mr Paul Evans	Chief Engineer
Mr Lindsay Cale	First Engineer
Mr Don Roberts	Electrical Engineer
Mr Norm Marsh	Bosun
Mr Gerry O'Halloran	AB
Mr Wayne Browning	AB
Mr Eddie Neowhouse	AB
Mr Les Clarke	Greaser
Mr Gary Hall	Chief Cook
Mr Peter Dux	Second Cook
Mr Ian Melder	Chief Steward



RV Franklin -Cruise 01/97 Cairns to Sydney
Jan. 9 1997-Jan. 23 1997

The Australian Marine Quaternary Program

Station List

The Australian Marine Quaternary Program

Station List

Station	date (local)	Time (local)	time (UTC)	lat.(S)	long.(E)	Water Depth (sounder, m)	Corer	recovery (cm)	CTD	Remarks
1	9.1.97						Grab-1		CTD-1	just off shelf edge at 1500, CTD to appr.200m, grab at 1550, sandy-silt carbonate, recovered
2	9.1.97	17.00	7.00	16 12.15	145 59.99	583	GC-1	387		rough topography at bottom, pretty steep, penetrated appr. 6m, very dense clay, sticky, obviously compacted
3	9.1.97	20.12		16 05.48	146 01.89	1241	GC-2	475	CTD-2	core might not have gone in vertically
4	10.1.97	17.45	7.45	14 56 34	149 08.87	1450			CTD-3	
	10.1.97	20.05	10.05	14 56.50	149 07.78	1450	GC-3	500		almost 5 m of ice-cream white foram ooze, sandy
5	11.1.97	1.30	15.30	15 29.77	149 29.67	1090	GC-4	500	CTD-4	very white foram sand, just enough mud to held it together, CTD-4 is called CTD-5 in CSIRO log sheets !!
6	11.1.97			15 48.00	150 00.00	750	Grab-2			first station on the Queensland Plateau. Lithified chunks of foram sand, Mn-coated and bored
7	11.1.97	12.50	2.50	15 59.89	149 59.39	660	Grab-3			recovered small amount of sand
8	11.1.97	15.36	5.36	16 11.83	150 11.85	842	Grab-4			
	11.1.97	16.40	6.40	16 11.77	150 11.81	848	GC-5	500		
9	12.1.97	7.00		15 47.95	149.59.95		Grab-5			??? check with log book
10	12.1.97	12.30		15 59.92	149 59.87		Grab-6			check with log book
11	12.1.97			17 18.7	150 41. 7	587			CTD-6	check position: 07 seconds or 70 seconds ?
	12.1.97			17 18.7	150 41.7	588	Grab-7			same as above 07 or 70, check remarks in log book
12	12.1.97		5.45	17 23.19	151 3.52	663	Grab-8			fine sand, probably ... ???, East Diamond Island, check position: 03 or 30
13										??????
14	12.1.97			17 06.60	151 47.80	600	Grab-9			fine sand with some rocky debris, coal and halimeda fragments. No GC taken as too sandy
15	13.1.97			17 00.05	151 48.00	767	Grab-10			sticky carbonaceous muds, plenty of pterypodis (winch rope snapped)
15	13.1.97			17 00.00	151 48.00	767.5				retrieved 0.58 miles east of position, but no core retrieved, core catcher damaged, bottom = mix of soft/hard sedim
16	13.1.97		22.00	16 58.81	152 22.91	1182	GC-6	352		check in log book, second corer retrieved
17		14.00	4.00	17 00.41	153 13.05	2000.3			CTD-8	core catcher failed
18	14.1.97		20.30	18 24.42	152 12.12	1992				core catcher failed
18	14.1.97		22.13	18 24.16	152 11.04	1992				core catcher failed, grab failed
19	14.1.97	14.36		18 53.95	152 01.41	950			CTD-9	Marion Plateau, GC not recovered
20							Grab-11		CTD-10	fine well-sorted sand recovered
21										
	15.1.97	20.00								new core catcher arrived off the beach (Whitsundays, Aerlie Beach)
22	16.1.97	21.45 ?		22 15.00	151 43.00	80	GC-8	200		very sticky grey mud (lacustrine ?), soft (mud) bottom
23	17.1.97		16.1.97: 19.	23.53 7	152 38.1	166	GC-9	123	CTD-11	very sandy grey mud, large shell material present, bottom seems to be softer here than off the north-central GBR
23b	17.1.97		20.35	22 59.76	152 48.00	335	GC-10	400		grey mud and sand, soft bottom
24	17.1.97		0.58	23 23.07	153 22.00	502	GC-11	570+20	CTD-12	full core barrel (570) + 20 cm from core catcher, core was still sandy
25			4.54	23 34.37	153 46.94	990.5	GC-12	640		700 cm core barrel, penetrated to the weights, 640 cm recovered
26	17.1.97		8.37	23 47.30	154 13.56	1482	GC-13			
26	17.1.97	19.12		23 47.80	154 13.16	1467			CTD-13	1465 = bottom
27			9.38	23 49.52	154 21.67	2004	GC-14			
28	18.1.97			23 49.15	154 37.34	2892 (?)	GC-15	50		hard compact muds, strong currents and wind, difficult to maintain position
28	18.1.97	2.59		23 49.72	154 37.19	3000			CTD-14	
29	19.1.97		22.55	25 07.89	159 22.75	2005	GC-16	622	CTD-15	fine ooze, core end was bent ????
30	19.1.97		9.20	26 00.49	160 07.11	1864	GC-17	320		Nanno-Ooze
31				28 00.60 ?)	160 15.00	2194				core catcher failed, swells, see log book

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Station List

32		22.55	12.16 (?)	29 57.65	159 51.10	2053	GC-18	420		500 cm penetration	
33	21.1.97	7.11	20.1.97: 20	31 00.62	159 20.06	2252	GC-19	460		penetration almost 700 cm, compaction	
34	21.1.97	10.54 ?		31 47.45	159 04.33	1258	GC-20	0		steep bottom off Lord Howe Isl., no pull-out, strong currents, hard bottom ?, no core, some coarse carbonate sand	