R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

CRUISE REPORT AND SUMMARY

R.V. 'FRANKLIN'

FR 6/85

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R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

13 February 1986

Cruise Summary
R.V. Franklin
FR 6/85

Scientific Programs

1) Time and Space Variability of the Great Barrier Reef Undercurrent.

2) Coastal Circulation due to Alongshore Pressure Gradients.

Principal Investigators

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Associate Investigators

1) Mr F.M. Boland
Dr J.C. Andrews

2) Dr J.A. Church

Itinerary (See cruise map: Figure 1, attached)

Depart Townsville	1000 hours Wednesday December 4, 1985
Arrive Cairns	1100 hours Thursday December 19, 1985

Cruise Objectives Achieved

For Scientific Program 1

Five current meter moorings along a section offshore from Townsville were recovered (CSIRO).

For Scientific Programs 1 and 2

CTD stations on the sections indicated on Figure 1. These sections comprise a total of 55 CTD stations. All the stations were to within 100 m of the bottom.

The Acoustic Doppler Profiler (ADCP) was on for most of the cruise, and some tests and ADCP sections were also carried out.

For Scientific Program 2

Three pressure gauge moorings at the outer edge of the Great Barrier Reef were recovered (CSIRO).

Three pressure gauge moorings and three current meter moorings were recovered from the mid-shelf region (UNSW). A fourth current meter mooring at Wigton Island was abandoned after two unsuccessful attempts. (Greg Nippard was dropped off at Mackay after the second attempt, and he made a further (successful) attempt at recovering this mooring).

Three shallow CTD stations were occupied in the mid-shelf region.

A test CTD station was performed early in the cruise.

Cruise Narrative (See cruise map: Figure 1, attached)

R.V. Franklin sailed from Townsville on time at 1000 hours on the 4th of December. We proceeded to the inshore end of the northern-most CTD section, and commenced CTD work. As soon as we reached waters sufficiently deep, a test CTD station was performed. The results of this station were inconclusive (see equipment reports). The five CSIRO current meters along this section were recovered, the only loss being one Aanderaa RCM. All other instruments were in good condition.

From there we proceeded to the off-shore end of the next CTD section, completed all the CTD stations, and picked up the CSIRO pressure gauge at the inshore end of the section.

We then proceeded, via Palm Passage, to the Holbourne Island pressure gauge (UNSW), which was recovered without incident. The Brampton Island current meter (UNSW) was recovered next, and Danny McLaughlan and Kevin Miller were put ashore while the mooring was recovered.

The Tern Island current meter and pressure gauge (UNSW) were recovered next, and then the first attempt at the Wigton Island current meter (UNSW) was made. The top float of this current meter had been found adrift some time previously, so it was expected that the mooring would be lying on the bottom. It seemed that the only practical way to recover the mooring was to dive for it, even though it was in 40 metres of water. This attempt was unsuccessful, so it was decided to steam out through Hydrographer's Passage to recover the Bugatti Reef pressure gauge (CSIRO) at first light the next day (successful), then the Creal Reef current meter (UNSW) on the way back to Wigton Island. We reached Wigton Island at slack water (the only time when it was possible to dive for this mooring), but the attempt was aborted when the UNSW pinger receiver failed to work (it had developed an intermittent fault).

After this second attempt, we put Greg Nippard ashore at Mackay - he would make a further recovery attampt using a chartered shark cat. We then proceeded to the Bell Cay pressure gauge (UNSW) which was recovered without incident, and then to the last of the CSIRO pressure gauges, which was also recovered without incident.

Because time seemed to be short at this stage, the eastern-most of the CTD sections which had been planned was abandoned. This section was by far the lowest priority of any work of the cruise, so it was felt that it was better to abandon it, rather than risk missing some of the more important stations later on. The CTD work continued without incident, except that when we got to the deeper stations, there seemed to be a problem with hysteresis in the pressure sensor (see equipment reports).

Once the CTD work was finished, we steamed to the off-shore end of the first CTD section, and steamed over the section at reduced speed with the ADCP going. We then proceeded to Cairns, berthing there at 1100 hours on the 19th of December.

Personnel

CSIRO Division of Oceanography

Neil White (Chief Scientist)
Len Zedel
Jenni Pragnell
Alan Poole
Fred Boland
Kevin Miller (until 8th of December)
Dan McLaughlan (unitl 8th of December)

University of New South Wales

Greg Nippard (until 10th of December)
David Griffin

REPORT ON SCIENTIFIC EQUIPMENT

CTD

CTD unit 2 was used for the entire cruise. A bottle testing station was done as soon as we reached water deep enough to have a well defined salinity minimum. This was inconclusive - all 12 dissolved oxygens were the same, but one or two of the salinities were out. This may have been due to sampling errors.

A total of 59 stations were performed.

Once we started doing deeper stations it was noticed that there was a substantial offset between the sample bursts and the down-casts. This is possibly due to hysteresis in the pressure sensor. The sensors were cleaned with alcohol before a couple of stations, and this seemed to solve the problem for those stations.

The pressure calibration seems to have 'slipped' since the previous cruise - it was usually reading about -4 or -5 on deck, whereas it had read 0 on the previous cruise. (The absolute accuracy of the pressure sensor is specified as ±6.4dB).

A problem with the oxygen sensor - a large spike at about 350 metres - recurred. This was a problem on a few stations from the previous cruise, and affects a couple of stations in this cruise. It is not a major problem.

We also did two test casts with the number 1 underwater unit. The problem with the digitising circuitry was not evident (although the data has not been examined closely yet), but this unit should not be used as a primary data gathering unit until it has been fully calibrated.

Rosette unit number 2 was used throughout the cruise, and performed faultlessly.

The corrosion on the rosette frame is getting worse. Something

should be done to prevent the corrosion continuing. The frame is acting as a sacrificial anode for the lead weights which are attached to the frame. Could these weights be either replaced with weights of different composition, or coated with a suitable substance?

Hydrology

Approximately 600 samples were collected and analyzed for salinity, dissolved oxygen, phosphate, silicate, and nitrate. All but a few of the samples were in the top thousand metres. Apart from some initial problems with the phosphate channel, the auto-analyzer worked well. It is not known with certainty what the problem with the phosphate channel was, but may have been a contamination problem, as it disappeared when the phosphate channel was re-plumbed.

Acoustic Doppler Current Profiler

Generally the ADCP worked well during this cruise. A few old problems are still with us, and a few new ones have appeared. The ADCP was on for most of the cruise, and some tests were carried out. A poly-carbonate window was tried, but the results of this test have not been evaluated yet. Further tests were carried out on the bottom tracking facility. The bottom tracking could be made to work, but the current profile data made little sense when the bottom track option was enabled.

XBT

The XBT system was not used or tested at all during the cruise.

Thermo-salinograph

The thermo-salinograph worked well this time - it didn't cut out once through the cruise. The alarm was installed towards the end of the cruise, so the thermo-salinograph cutting out should be less of a problem in the future than it was in the past. The overflow from the tank should still be checked frequently (at least hourly).

A quick comparison with the CTD salinity showed that the thermo-salinograph salinity is about .06 psu's low. This may, of course, be partly or wholly due to an offset in the temperature calibration of the thermo-salinograph. More detailed checks will be carried out when the next set of CTD data is calibrated.

Navigation

The Intech gave little trouble this cruise, and worked as well as it can be expected to. Apart from the fact that it accepted some bad fixes and the clock was wrong for part of the cruise it gave very little trouble.

Met station

The Met station worked satisfactorily. A loose connection caused the wind speed to be incorrect early in the cruise. The radiation sensor was installed and seems to work, but no data was logged by the computer.

The Master felt that the wind speed displayed by the met station was consistently low.

Sounder

Worked well during the whole cruise.

COMPUTER SYSTEM

The computers on board fell into two classes - those which worked quite well, and those which hardly worked at all. The computers which worked well were the ones which were needed!

The PDP Micro-computers have now all been fitted with 50 Hz references, so they all kept good time. They were all within a couple of seconds of one another throughout the cruise, even though the 'Network Time' routines are not yet working.

VAX

Failed after one day. A small amount of hydrology information had been entered up to this stage. This will probably be discarded. Because the VAX has worked well for three cruises, people are starting to rely on it being there - at the moment, the only end of cruise procedures are on the VAX. Perhaps the possibility of using the CTD Micro-11 as a 'front end' for the hydrology system could be investigated. This could possibly save a substantial amount of data entry work in Hobart.

A temperature cut-out switch on the mains supply to the VAX was installed in Townsville.

The DEC engineer replaced the disc drive motor after we arrived in Cairns, then made another substitution the next day. This caused the disc drive to fail with another fault.

PDP Micro-computers

Micro #1

The navigation and meteorology logging systems were on this computer, as well as the program which writes all the data files to tape. The navigation and meteorology programs seemed to work well, but the program which writes the data files to tape did very little. I understand that this problem and minor problems with the navigation and meteorology systems are being dealt with.

Micro #2

This is the bridge micro. A test program was run on this computer before the cruise started, and errors occurred which indicate that the problems with this micro exist even when all the ships radars and communication equipment are switched off. It was not used at all through the cruise.

Micro #3

Logged the thermo-salinograph data. It worked well through the cruise, and I understand that a few minor problems are being dealt with.

Micro #4

Has been superseded, as the PDP 11/73 is now being used to log ADCP data. It was used for a few jobs which the VAX would otherwise have been used for, such as reading data from S4 current meters.

Micro #6

Logged the CTD data throughout the cruise. The only problem seems to be that the interface between the computer and the CTD deck unit still locks up occassionally (twice during this cruise). The solution to this may to be to disconnect one of the pins.

Micro #7

Is the PDP 11/73. This was used for logging the ADCP data. The computer gave no problems, the main difficulty being that the GPIB interface routines don't obviously support asynchronous I/O. The tape drive on this micro (formerly on Micro #4) was adjusted by the DEC engineer in Townsville, and gave no trouble through the cruise (this tape drive has snapped a few tapes in the past).

ELECTRONICS REPORT

1. CTD System

The 1150 data terminal and rosette system performed faultlessly throughout the cruise. CTD performed well except for a small offset of salinity on the upcasts on about 4 stations. The sensors were thoroughly cleaned and the problem has not recurred. Two test casts were performed on CTD 1 which will be analyzed back in Hobart. No obvious problems appeared. The altimeter requires a new under-water cable. The carriageway requires urgent attention.

2. Thermo-salinograph

Unit performed well throughout the cruise. The pump did not drop out, although sea conditions were fairly smooth all trip. There is a small problem with the analog output which drops out as temperature goes from 28.12 to 28.13 degrees.

3. EK 400 Sounder

Sounder performed well all trip. The mistrigger problem still persists. However, we are awaiting further advice from SIMRAD.

4. INMARSAT System

Some difficulty was encountered getting through on occassions. Initial test of the modem interface were unsuccessful.

5. XBT System

This was not used this cruise.

6. Met station

Light sensor installed and working. However it is un-supported on the micro. The wind speed was erratic at the start of the cruise. This problem was traced to a loose wire.

7. Satellite Navigators

The 'Shipmate' continues to perform well. The Intech was better behaved this trip, but, since nothing has been touched since the last cruise, its reliability must still be questionable.

8. Pinger

Three tests were carried out on the pinger. The first was on the hydro wire, which gave good results. The other two were with the pinger

on the towing wire using different engine configurations to minimize noise from the ship and turbulence. These showed that the pinger could be seen on the sounder at speeds up to two knots, and could be flown confidently at about 20 metres from the bottom. More practice should realise distances much closer to the bottom. The optimum speed appears to be about 1 knot, as this gives a good compromise between wire angle, low noise, and the ship can still maintain steerage way.

Alan Poole
For Electronics Section

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OTHER EQUIPMENT

Winches

The spooling on the CTD winch continues to cause problems. The main problem areas are at the crossovers when more than 2000 metres of cable are out. The spooling works better if the cable is wound in at 10 metres/minute through these areas.

CTD Hoist

The hoist was losing grip through the trip. The Chief Engineer adjusted it at the end of the cruise, and seems to have solved one of the problems, i.e., the drive chain not engaging the sprocket properly, but the carriage which moves along the rail has 'spread', resulting in less contact between the drive wheels and the rail.

MOORING GROUP REPORT

Meter type	Meter number	Mooring number	Recovery time		
IOS	S4/1	76	2057Z	4/12/85	Note #1
RCM4S	7975	76	2105Z	4/12/85	AIMS meter
RCM4S	7974	76	2118Z	4/12/85	AIMS meter
RCM4	6800	76	2132Z	4/12/85	AIMS meter
ACR (Benthos)		76	2137Z	4/12/85	AIMS ACR
RCM4	1731	75	0003Z	5/12/85	
RCM4	571	75	0017Z	5/12/85	
RCM5	6167	75	0033Z	5/12/85	
RCM5	6169	75	0052Z	5/12/85	
ACR	204403	75	0100Z	5/12/85	
RCM4	4727	74	-	5/12/85	Note #2
RCM5	6560	74	0318Z	5/12/85	
RCM5	7156	74	0252Z	5/12/85	
ACR	400907	74	0242Z	5/12/85	
RCM4	7199	73	0542Z	5/12/85	
RCM5	7155	73	0600Z	5/12/85	
RCM5	7776	73	0619Z	5/12/85	
ACR	103307	73	0621Z	5/12/85	
RCM4	1276	72	2230Z	5/12/85	
RCM5	7157	72	2250Z	5/12/85	
RCM5	6166	72	2310Z	5/12/85	
ACR	401107	72	2310Z	5/12/85	
TG	107	71	2206Z	6/12/85	
ACR	395/4	71	2206Z	6/12/85	
TG	106	70	2046Z	9/12/85	
ACR	395/5	70	2046Z	9/12/85	
TG	117	69	2325Z	11/12/85	Note #3
ACR	100301	69	2325Z	11/12/85	

Note #1

We have only been able to recover 6 days of data from the S4 meter. It is not clear from the meter diagnostics whether there is any more. The counter which stores the total number of records indicates that there is six months of data inside, but the flag which shows the location of the next vacanct memory slot indicates only six days. The data and all the diagnostics have been sent to IOS for comment.

Note #2

Mooring #74 parted just above the first set of back-up floats. A steel 37" sub-surface float, RCM4 #4727, and 350 metres of wire are missing. The

break is almost certainly due to failure to correctly secure the shackle at this point.

Note #3

TG 117 was not running when it was opened. Battery voltage was 1.76 (normal is about 9 volts). It seems to have used about 2/3 of the tape used by the other tide gauges.

All other meters were clean, dry and running when opened. Since the VAX was out of commission, no data has been read on this cruise. It should all be processed on the next trip.

Fred Boland

UNIVERSITY OF NEW SOUTH WALES INVOLVEMENT

Diary

4-7 Dec — 8 hour on/8 hour off watch keeping. CTD stations and CSIRO mooring recovery.

8 Dec — SCUBA retrieval of first UNSW pressure gauge, Holbourne Island, and recovery using the Zodiac inflatable runabout of the first UNSW current meter, Brampton Island. Three UNSW CTD stations performed in 50 m depth.

9 Dec — SCUBA retrieval of second UNSW pressure gauge, Tern Island, and nearby current meter using the inflatable and the aluminium runabout. Unsuccessful attempt to retrieve the collapsed current meter mooring at Wigton Island. The accuracy of location of the mooring from the surface was insufficient for divers to find it with such limited visibility, bottom time and high current.

It had been hoped that the current meter would be detected on the ship's bottom tracking colour sounder but despite several passes over the general area this did not happen.

Consequently a marker line was deployed from the Franklin after the position was found using our directional pinger locator on the inflatable. Unfortunately the sea anchor weight did not fall within 50 m of the current meter, the maximum possible search radius of the dive.

After the unsuccessful recovery dive we proceeded out through Hydrographer's Passage overnight with the Acoustic Doppler Current Profiler operating. UNSW has previously conducted fieldwork in this region and so current profiles would be a valuable supplement to our data set. Unfortunately, the profiler did not function very satisfactorily for technical reasons.

10 Dec — Inclement weather delayed the retrieval of a CSIRO pressure gauge from the outer reef, putting the day's work behind schedule. Retrieved a UNSW current meter from near Creal Reef using the inflatable and aluminium runabouts and proceeded back to Wigton Island where a second unsuccessful attempt at retrieving the collapsed current meter was made. No dive was performed because the slack tide was missed by over an hour and the UNSW pinger receiver malfunctioned. CSIRO and UNSW personnel agreed that it would be more effective for Greg Nippard to disembark at Mackay and attempt further dives from a smaller, more manoeuvrable vessel with more time available.

11 Dec — Retrieved last UNSW pressure gauge from Bell Cay and the last CSIRO pressure gauge from the outer reef.

12-19 Dec — Endless CSIRO CTD stations in deep water. Maintained 8 hour on/8 hour off watches.

Notes

The patient, willing and competent assistance of the Master and crew of R.V. Franklin was much appreciated throughout the cruise.

Neil White is to be congratulated as a responsible, wise yet popular cruise leader.

Alan Poole (CSIRO), Ian Mann (Chief Engineer) and Mike Stanton (First Mate) rendered invaluable assistance with the diving and other small boat operations.

Our only dissappointment was with the Master's initial reluctance to bring the vessel within half a mile of our moorings even before we activated the acoustic release. Hence we feel that the long trips from the Franklin to the mooring site wasted time and outboard petrol, particularly at a critical time on our schedule where we were trying to meet a tide dependant deadline. At Brampton Island this was understandable due to the bathymetry, but at Creal Reef and Tern Island there were no shoals within miles of our current meters. At Wigton Island, however, we were grateful. He was happy to make repeated passes over the current meter site looking for the collapsed mooring on the sounder.

We feel that these criticisms are not unfounded based on our previous experience on R.V. Sprightly doing similar work in the same region.

In all other respects we were more than happy with the performance of both the ship and her Master and crew.

A possible minor improvement could be made by ducting the Ops/Computer room air conditioning THROUGH the equipment leading to greater equipment reliability and far more comfortable conditions for the personnel working in these rooms.

Greg Nippard did manage to recover the Wigton Island current meter making the cruise completely successful.

Greg Nippard
David Griffin

Comments of Operations Manager on above report on mooring recovery

1. This was the first time that the ORV had been asked to manoeuver in a restricted situation and a certain tentativeness would be expected.

2. The ORV does not have the manoeuvrability and power of SPRIGHTLY and in addition it is much more affected by windage.

3. When working in a restricted situation, such as in this case among the Barrier Reef Islands, and reefs, the ability of the ORV will always be affected by chart reliability, visibility, sun angle, weather conditions etc. FRANKLIN is a relatively big ship (1200 tonnes) and cannot be expected to carry out operations with the same facility as smaller boats with some local knowledge.

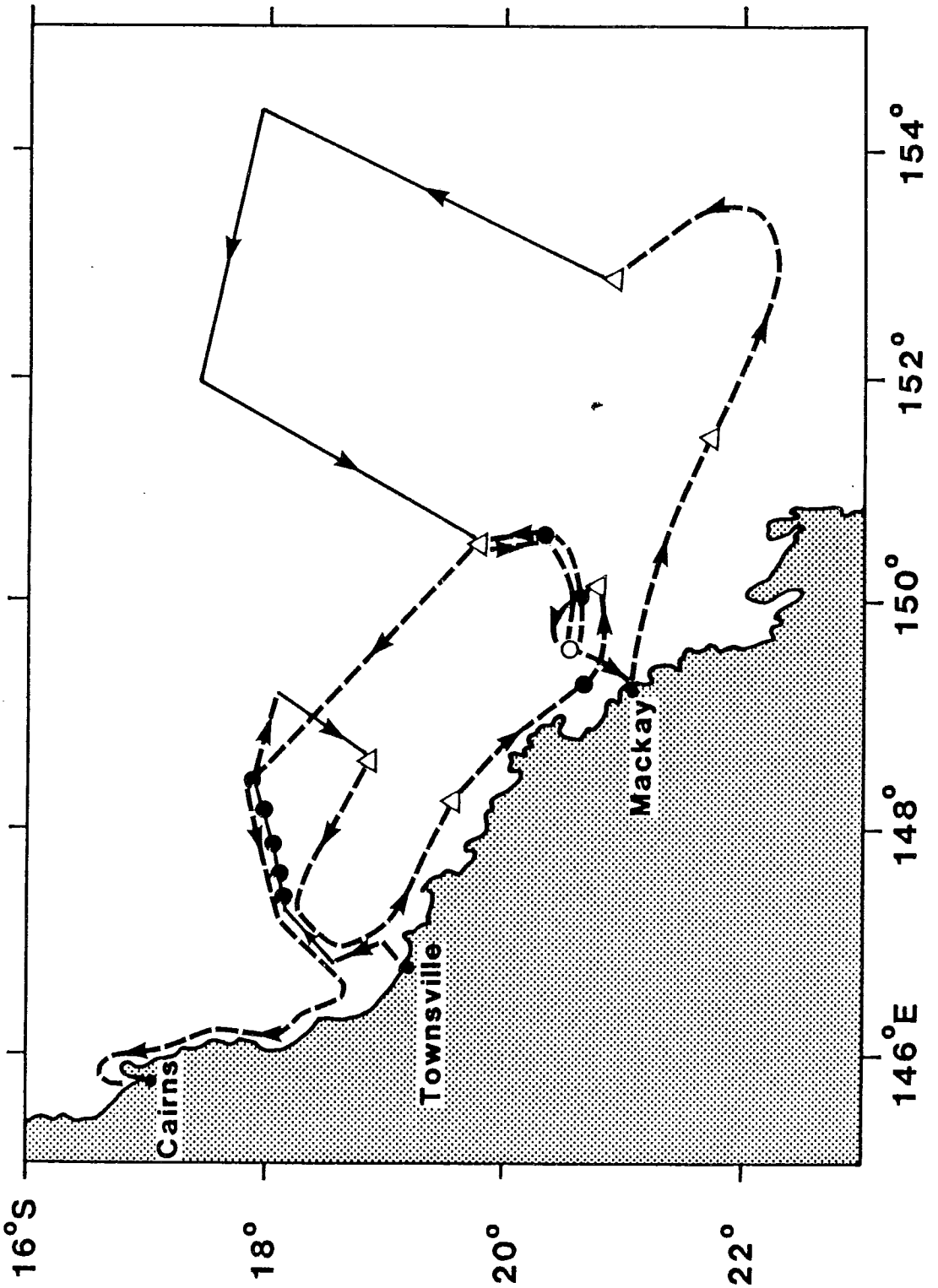

Figure 1 Cruise track, showing CTD sections (solid lines), pressure gauge moorings (triangles), recovered current meter moorings (solid circles), and the Wigton Island current meter mooring (open circle).