

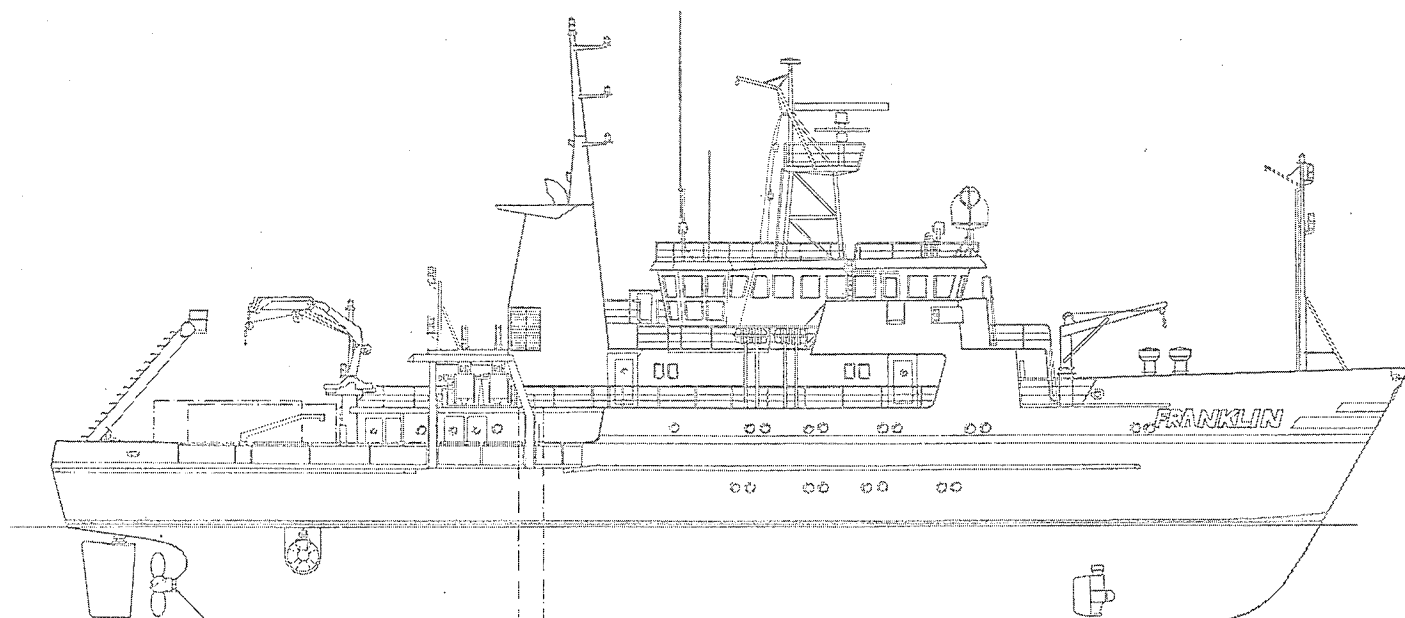
R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

CRUISE SUMMARY

R.V. 'FRANKLIN'

FR 3/87



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R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

JAC/BB

3 April 1987

CRUISE SUMMARY

RV FRANKLIN

FR 3/87

Scientific Program

The Leeuwin Current Interdisciplinary Experiment (LUCIE):
Moored Instrument Arrays

Principal Investigators

John A. Church, CSIRO Division of Oceanography
Dr J.S. Godfrey, CSIRO Division of Oceanography

Cruise Objectives

FR 3A/87

1) Complete 2 CTD sections while in transit from Adelaide to Bunbury.

FR 3B/87

1) Service four current meter moorings on a line across the continental shelf off Dongara.

2) Redeploy a moored meteorological buoy on the continental shelf break off Dongara.

3) Deploy 4 current meter moorings across the continental shelf along a line of latitude, 34°S. One of these to be a meteorological buoy moored at the shelf break.

4) Complete standard LUCIE CTD sections normal to the coast and a north south CTD section to give a closed box of CTD stations to the bottom.

5) Service 2 pressure gauge moorings.

Itinerary

Depart Adelaide	0001	24	January	1987
Arrive Bunbury	1130	30	January	1987
Depart Bunbury	1600	31	January	1987
Arrive Fremantle	1300	17	February	1987

Cruise Narrative

The cruise track is shown in Fig. 1.

After leaving Adelaide, the pH meter and the fluorometer were run until off the shelf. The ship then steamed directly for the first CTD station on the Albany section. Two CTD sections (offshore from Albany and Cliffy Head) were completed in good weather.

At Bunbury, the biological container was unloaded and the meteorological buoys (and associated mooring equipment) were loaded. In hindsight, the railway wheels (mooring anchors) should have been reorganised.

On leaving Bunbury, the ship steamed north to the Dongara section.

The meteorological buoy (WOMBAT) was deployed and a number of current meter moorings recovered and redeployed. Because of the marginal weather conditions, the anchors in the hold could not be moved and not all of the mooring work was completed. The Dongara CTD section was also completed (all stations to the bottom). Because of the marginal weather conditions, it was decided to head south for Rottnest Island (to shift the anchors), and thence to the 34°S section. It was hoped that the large, approaching high would mean there were favourable weather conditions for the mooring work at 34°S and for the CTD section.

By the time we had reached Rottnest Island, the weather had moderated and the anchors were moved and the second meteorological buoy prepared. The mooring work at 34°S and the first few CTD stations were completed in light winds. However, there was still a large swell. FRANKLIN then steamed to Bunbury for J. Church to disembark before returning to the 34°S CTD section.

The 34°S CTD section was completed (all stations to the bottom) and then the section north to the end of the Dongara CTD section was completed (all stations to the bottom), the mooring work was completed and we steamed north to the Carnarvon CTD section. After completing this section, we steamed south, did a short (4 station) Dongara CTD section, and steamed to Fremantle.

Work Completed

CTD sections (to 2000 m) were completed offshore from Albany, Cliffy Head, and Carnarvon (Fig. 2). CTD sections (to the bottom) were completed at Dongara and at 34°S. A north-south CTD section (to the bottom) between the offshore ends of the Dongara and 34°S section was completed. Short CTD sections (about 3 stations) were completed at the pressure gauge moorings at 29°S, 30°30'S and 33°30'S and at Dongara.

Two meteorological buoys were deployed. Two pressure gauge moorings were

recovered and redeployed. Four current meter moorings were recovered and redeployed on the Dongara section. Three current meter moorings were deployed on the 34°S section. CTD stations, samples were taken for nutrient analysis.

The Doppler profiler was run continuously and two sets of Doppler tests were completed.

The thermosalinograph, meteorological system and depth sounder were run continuously.

Equipment Report

CTD - The CTD system worked well most of the time. However, there are still problems between the CTD deck unit and the computer. These need attention before data is inadvertently lost.

The CTD was put on the bottom once but there was no apparent change or calibration change. The software should be modified to list the real depth (and the "sounder depth") so that stations to the bottom can be completed more easily.

Hydrology Sampling - Some plotting of the data was done on board. There are a number of anomalous values and the data will need careful editing. There is also a calibration problem for the oxygen data.

Underway Equipment - The thermosalinograph, the meteorological system and the event log program (DELP) worked well.

The computer network time drifted at one stage; apparently due to degradation of the disk on micro 6.

Navigation Equipment

The Intech Satnav failed a number of times. Interfacing the shipmate to the computer system should be considered.

The GPS system appeared to work well. However, there is still need for an operation input. These procedures need to be formalised and controlling the GPS receiver from the logging computer should be considered.

ADCP

The ADCP operated continuously throughout the cruise. However, there is a general tendency to turn on the machine at the start of the cruise and thereafter to assume that it is collecting high quality data. For example, after leaving Bunbury, the percentage good data was very low (less than 50%). This quality of data is unacceptable. If high quality data is to be collected, more user attention is required. The percentage was improved by changing the screening thresholds. It appears that useful data can be obtained in poor weather conditions if appropriate attention is paid to the real time display. However, we require more experience to determine how low the screening criteria can be set (particularly in poor weather conditions) and still maintain high quality data.

Eric Firing's (of University of Hawaii) view (prior to recent discussions) was that in poor weather conditions the data quality became poor and that with worsening conditions the data eventually becomes useless. However, it appears that we can do something to maintain the quality of data (at least to some extent).

Electronics Report

1. CTD System. The only problems with the CTD system was the failure of the rosette deck unit. The main printed circuit board was replaced with a spare and there were no further problems.
2. EK400 Sounder. No problems were encountered during the cruise.
3. Thermosalinograph. This has been exhibiting some unusual behaviour at times and was reset on several occasions. This cured the problem for a time but problem will require further investigation. The pump housing also cracked and was temporarily repaired.
4. Intech Satellite Navigator. After repair of the antenna the Intech has behaved much better. It did stop on two occasions when in great circle mode. We have since left it in rhumb line mode and has given no problem.
5. Acoustic Doppler Current Profiler. This performed well throughout the cruise.
6. Inmarsat. Difficulty was encountered by Hobart getting through at times. One of the problems working in the areas where the boat has been is the low elevation angles to the satellite. This means that the dish is often pointing at the superstructure of the ship thus causing the signal to drop out and often the tracking has been unable to re-establish itself when signal is returned.
7. XBT System. This gave no problems.

All electronic equipment with the exception of the thermosalinograph performed well with the result a relatively trouble free cruise.

Alan Poole
for Electronics Section

Computing Report

Most data acquisition programs ran smoothly; slight problems encountered were

ADCP - an error in the S/W prevents the logging of more than about 15 minutes of raw data. System pool is consumed. Also, running any tasks on micro 7 while logging Doppler data seems to cause problems. Rewrite of S/W is recommended.

CTD - an I/O port could not be reset, and micro 6 had to be rebooted. A rare problem (hopefully).

GPS - a change in the format of the output from the GPS caused errors in the ADCP/GPS interface task. Notification of the format change was not made to the relevant personnel at the time of the change. A scheme is needed to ensure the reference position is updated.

TSG - H/W continues to provide erratic output frequency. Otherwise, data is OK.

Timing - the times on each of the micros became unsynchronized (reason unknown, but could have been disk corruption).

Ken Suber

Mooring Group Report

Departed Bunbury at 1600 LT on 31/1/87. Miller, McLaughlin and Boland on board. Cruise is in WA water and local time is GMT -8 hours. After leaving port we went straight to the position of the met buoy off Dongara arriving at 0800 on 1/2/87. The weather was too rough for buoy deployment and we started the CTD section. Conditions weren't too bad, but because of the amount of gear on board we have to get rid of the discus buoy before we can do anything else.

4/2/87 0630 LT. On station and preparing met buoy. Underneath the top meter is ACMS #1196, then ACM2 #1251 and ACM2 #1260. There was a long delay due to a failure of the Argos beacon, it was replaced with a spare unit. The mooring was finally away at 0943 LT, position (from the GPS) 29°31.783'S, 114°15.147'E.

We went out to the buoy to install the top instrument section. This is a new false top designed to make the buoy more visible and is removable so that some of the more vulnerable sensors are not on the buoy during launch. This was accomplished without major drama. After launch we moved inshore to recover the 50 meter mooring. This was the one for which we had no release and which was a traditional U-shape. To everyone's surprise both the toroidal marker buoy (which was on a separate line) and the surface line from the main mooring were on the surface. The only thing missing was the 24" steel surface float from the main mooring. Recovery started at 1430 LT, RCM5S #7659 out of the water at 1455 LT and ACM2 #1257 at 1457 LT. The operation was done using the mooring winch which handled the strain without any trouble. On the same day we recovered the marker buoy.

The 50 meter mooring was replaced immediately with SMART ACM #43 (borrowed from Flinders University), RCM5 #7773 and ACR #401107. Times in the water: 1752 LT, 1805 LT and 1816 LT. Position 29°22.6'S, 114°36.7'E, depth 50 m on the ship's sounder.

5/2/87 0700 LT. On site to recover the mooring at 110 meters. Release was fired at 0836 LT and recovery started at 0900. Times out of the water: RCM5S #7830 at 0907 LT, RCM5S #7838 at 0910 LT, RCM5S #7837 at 0916 LT, RCM5S #7663 and ACR #100301 at 0920 LT. Note that the rotors on #7830 and #7638 were partially blocked by barnacles.

5/2/87 1200 LT. On station for recovery of the 300 meter mooring. Enable at 1221 LT, range .516, release at 1248 LT and floats sighted at 1249. Times out of the water: VACM at 1307 LT, RCM5S #7839 at 1315 LT, RCM4 #571 at 1319 LT, RCM4 #7155 at 1331 LT and ACR #204403 at 1335 LT.

5/2/87 1425 LT. On station for recovery of 700 meter mooring. Enable at 1436 LT and no reply. Due to a transcription error we were in the wrong place. Started again at 1558 LT, range 2.51 kms. This one took a long time to track down, the release was finally fired at 1708 LT, horizontal range 90 meters and it was sighted at 1709 LT. Times out of the water: ACM2 #1120 at 1741 LT, RCM5 #7157 at 1750, RCM5 #6166 at 1805 LT, RCM5 #7199 at 1817 LT and ACR #401007 at 1830 LT.

At this time we were planning to relay the array, but the weather was not very good and we felt it was unsafe to try removing the new anchors from the hold. After a look at the prognosis we decided to run south, anchor behind Rottneest Island to rearrange the deck and lay the southern line first.

7/2/87 0900 LT. For a change the weather was in our favour with a beautiful day, no wind and a long large swell (approximately 8 metres). We started with the toroid met. buoy which went over the side at 1030 LT, and the anchor was dropped at 1130 LT. The other instruments were ACM2 #1120 and the S4 meter. Position 34°00.31'S, 114°28.56'E, depth 198 meters on the ship's sounder. We decided to launch the buoy with all the sensors on board and for a change the launch was perfect.

7/2/87 1530 LT. On station for the inshore mooring. In the water times: SS37 #244 at 1555 LT, RCM5S #7659 at 1607 LT and ACR #400907 at 1615 LT. Anchor away at 1631 LT. Position 33°59.8'S, 114°42.8'E, depth 116 meters on the ship's sounder.

7/2/87 1930 LT on station for the shelf-edge mooring. In the water times: Radio buoy (frequency 26.995 mhz.) at 1943 LT, SS37 #2435 at 1945 LT, RCM5 #7776 at 1950 LT, RCM5 #7772 at 2003 LT and ACR #603355 at 2020 LT. Anchor away at 2023 LT. Position 33°58.9'S, 114°28.7'E, depth 186 meters on the ship's sounder.

7/2/87 2200 LT on station for the offshore mooring. Times in the water: Radio buoy (frequency 156.875 khz.) at 2207 LT, SS37 #2443 at 2212 LT, RCM5 #7777 at 2219 LT, RCM5 #6167 at 2227 LT, RCM5 #7776 at 2235 LT, RCM5 #7778 at 2242 LT and ACR #603255 at 2252 LT. Anchor away at 2302 LT. Position 33°59.06'S, 114°24.89'E, depth 720 meters on the ship's sounder.

Although the longshore moorings were originally planned to be in the water for the whole of the LUCIE period I was beginning to have some doubts about their ability to survive for that length of time given the amount of fouling we observed on the Dongara line. We therefore decided to pick up two of them and see what condition they were in.

8/2/87 0930 LT on station for tide gauge at Cape Naturaliste Enable at 1000, range 1.8 kms. Release at 1025 LT and mooring sighted at 1031 LT. Everything (RCM #586, TG #106 and ACR395 #7) on board together at 1045 LT. The tide gauge looked OK, but the current meter was very heavily fouled and the rotor had stopped turning. After some cleaning up the mooring was replaced the only change being the current meter. Times in the water: RCM5S #7838 at 1332 LT, TG #106 and ACR395 #7 at 1335. Anchor away at 1335 LT. Position 33°37.10'S, 114°43.5'E, depth 73 meters on the ship's sounder.

There followed a few days of CTD stations while we worked our way back north.

11/2/87 1800 LT on station for tide gauge at 29°S. After seeing the

condition of the previous tide gauge mooring we decided to pick up the next one for another check. All the longshore moorings from here up were anti-fouled. Enable at 1806 LT, range .21 kms, release fired at 1807 LT and mooring sighted at 1809 LT. Instruments (RCM4S #7662, TG #84 and ACR395 #6) on board at 1819 LT. The same mooring was re-deployed with a new current meter. Times in the water: RCM5S #7837 at 2109 LT, TG #84, ACR395 #6 and anchor at 2119 LT. Position 30°00.5'S, 114°32.5'E, depth not recorded.

Finally we were back on the Dongara line for the last three moorings.

12/2/87. 110 m. mooring. Times in the water: SS37 #2459 at 0836 LT, RCM5S #7839 at 0849 LT, RCM5S #7830 at 0900 LT, RCM5S #7863 at 0907 LT, RCM5 #7155 at 0924 LT, ACR #100301 and anchor away at 0927 LT. Position 29°34.3'S, 114°17.5'E, depth 107 metres. From this mooring the discus buoy bears 337° at 3.15 miles.

12/2/87 300 metre mooring. Times in the water: Radio Buoy (frequency 156.725 khz.) at 1034 LT, SS37 #2442 at 1036 LT, VACM at 1042 LT, RCM4 #571 at 1048 LT, RCM5 #6166 at 1100 LT, RCM4 #7199 at 1110 LT and ACR #401007 with anchor at 1129 LT. Position 29°35.86'S, 114°13.02'E, depth 308 metres on the ship's sounder.

12/2/87 700 meter mooring. Times in the water: Radio buoy (frequency 27.094 MHz) at 1244 LT, SS37 #2438 at 1246 LT, ACM2 #1257 at 1250 LT, RCM5S #7662 at 1300 LT, RCM4 #586 at 1306 LT, RCM5 #7157 at 1315 LT, ACR #204403 with anchor at 1335 LT. Position 29°38.97'S, 114°02.89'E, depth 696 metres on the ship's sounder.

After this was all finished we received a message from Hobart saying that the southern met buoy (the toroid) was not transmitting data. ARGOS is providing information but the data is coming in as a stream of zeros. After some thought we decided not to do anything about it for several reasons. Firstly we are not very clear what can be done, secondly so far as we know the data is being recorded on the data logger and thirdly we would have to abandon the next two CTD lines to get back south with no guarantee of good weather when we arrived.

The rest of the cruise was spent doing CTD stations and processing the data. All the Aanderaa tapes were read and processed to the E-file stage. Unfortunately the Neil Brown tape reader was lost by the airline on the way over and I was unable to read these tapes. The cruise finished in Fremantle at 1400 on 20/2/87.

F.M. Boland

Scientific Personnel

Adelaide - Fremantle

N. White
A. Poole
K. Suber
M. Rayner

Adelaide - Bunbury

Bob Edwards
Keith Adams

Bunbury - Fremantle

F. Boland
D. McLaughlin
K. Miller

Bunbury - Bunbury

J. Church

Bob Edwards was Chief Scientist from Adelaide to Bunbury (24-30 January 1987).

John Church was Chief Scientist from Bunbury to Bunbury (31 January - 8 February 1987).

Neil White was Chief Scientist from Bunbury to Fremantle (8-17 February 1987).

General Comments

There needs to be some oceanographic references on board (as there was on SPRIGHTLY). For example, we wanted to look up Mathew's Tables during the cruise but there were no suitable texts.

I feel the cruise was successful. The ship and the scientific equipment worked well, and the ship's crew and the scientific personnel all performed well. The mooring group gave a very professional display.

I would like to thank all the personnel who made the cruise successful and especially thank those who prepared for the cruise in my absence.

John Church

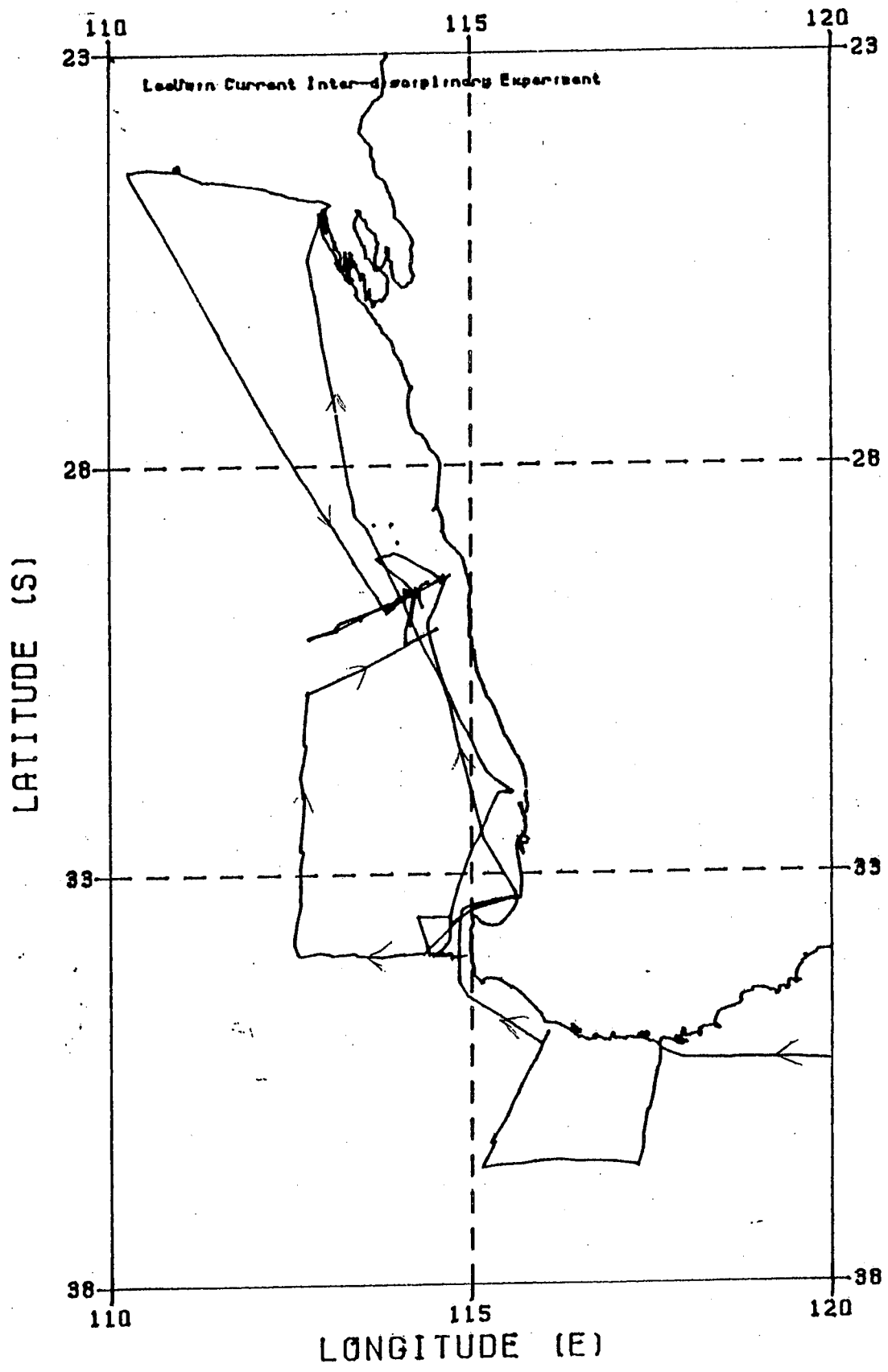


Figure 1

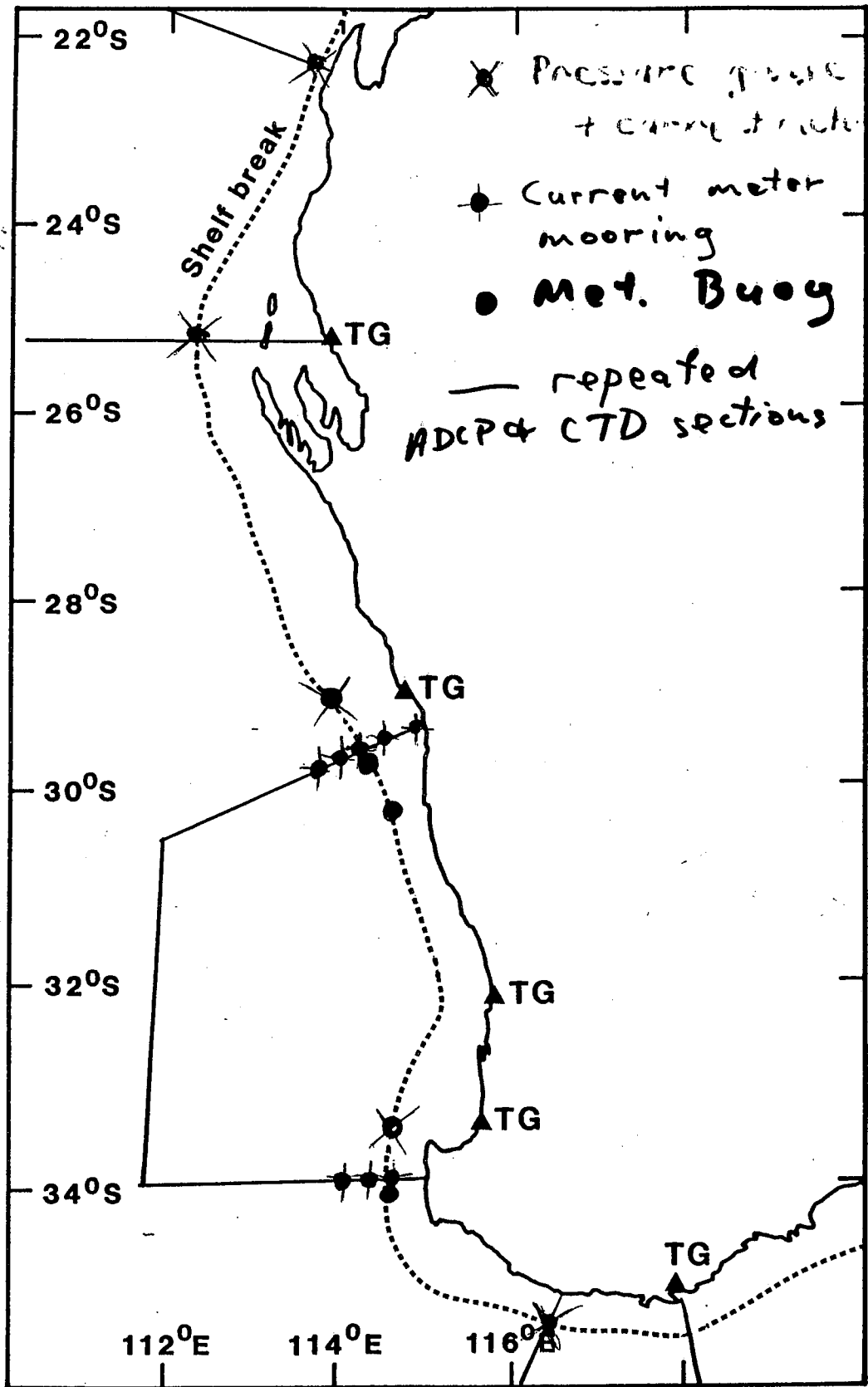


Figure 2