R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

RESEARCH SUMMARY

CRUISE FR 6/90

Sailed	Townsville	0720	Fri 6 July 1990
Arrived	Cairns	1100	Wed 18 July 1990
Sailed	Cairns	1600	Thu 19 July 1990
Arrived	Cairns	1600	Thu 2 August 1990

Principal Investigators

Dr Derek Burrage
Australian Institute of Marine Science, Townsville
&
Dr George Cresswell
CSIRO Division of Oceanography, Hobart

Western Boundary Closure of the Tropical South Pacific Circulation in the Coral Sea

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Thierry Correge and Patrick De Deckker,
Dept.of Geology, Australian National University

Geochemistry of Living Ostracod Shells for use in Palaeoceanography

10 August 1990

For further information contact

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Contents:

Objectives:

1 To observe connections and estimate volume budgets for the Coral Sea current system comprising the SEC, the Great Barrier Reef Undercurrent, the clockwise circulation around the Gulf of Papua and the outflows to the Tasman and Solomon Seas.

2 To investigate the continuity of water types and water masses in the Coral Sea current system by measuring temperature, salinity oxygen and nutrient properties.

3 To measure the surface currents associated with the Coral Sea current system using hydrographic and Acoustic Doppler current data.

4 To deploy Lagrangian satellite-tracked buoys in the four major current features.

Piggyback and Ancillary Projects:

Thierry Correge (ANU, Dept. of Geology)
Geochemistry of Living Ostracod Shells for use in Palaeoceanography.

W. Skirving (JCU, Dept. of Geography)
NOAA Satellite ground- truthing and infra-red radiometer inter-comparison (in Collaboration with Dr Ian Barton, CSIRO Division of Atmospheric Research.

Rowan Hughes (JCU, Dept. of Civil and Systems Engineering)
Numerical Circulation models of the Coral Sea (under supervision of Dr. Lance Bode, James Cook University and Dr. Derek Burrage, Australian Institute of Marine Science).

Scientific Crew:

Twelve hour watches were maintained with the following variations: Skirving followed a day time watch to facilitate cloud studies, while Burrage did so to allow scientific oversight of operations on both watches. Jan Peterson extended her watch (commencing early) to fully utilise the 14 hr GPS period for Acoustic Doppler Observations and Processing.

Watches

(A <=> 1300-0100, B <=> 0100-1300 D <=> 0700-1900)

Cabins (A-F)				Part I	Part II (changes only)
A		Dave Vaudrey	(CSIRO)	A	A
A		Phil Adams	(CSIRO)	B	B
B		Mark Rayner	(CSIRO)	A	B
B		Dave Terhell	(CSIRO)	B	A
C	E	John Soles	(AIMS)	A	A
	C	Lance Bode	(JCU)		A
C	F	William Skirving	(JCU)	D	D
F	C	Rowan Hughes	(JCU)	B	B
D		Bernadette Baker	(CSIRO)	A	A
D		Jan Peterson	(CSIRO)	B	B
E		Thierry Correge	(ANU)	A	
CH		Derek Burrage	(AIMS)	D	D

Ship's Officers and Crew:

Part I

Captain Neil Cheshire, Chief Engineer Peter Noble, Mate Dick Dougal, 2nd Mate Mike McAuley, 2nd Engineer Ron Parrott, Electrical Engineer John Laarkamp, Bosun Jannick Hansen, AB Bluey Hughes, AB Kris Hallen, AB Norm Marsh, Greaser Dave Surridge, Ch Steward John Fitzgerald, Ch Cook Russell Anderson, 2nd Cook Geoff Davis.

Part II

As for Part I, but with Ch Cook Gary Hall, 2nd Cook Bob Clayton and Greaser Paddy McLure replacing Anderson, Davis and Surridge respectively.

Work Summary:

The cruise was divided into two parts. Mr. Thierry Correge's ostracod sampling and use of Dr Ian Barton's infra-red radiometer were confined to the first part. Dr. Bode joined the cruise during the second part. CTD, XBT and ADCP observations spanned both parts.

Part I. 0722 EST 6 July - 1100 18 July

Part II. 1600 EST 19 July - 1230 2 August.

A total of 123 CTD Stations were completed along 16 transects spanning the western

Coral Sea to within 15 m of the bottom or to a maximum depth of 4000 m. See cruise track (Fig 1) for locations of CTD transects. Water sampling for nutrients, (reversing thermometer) temperature and salinity sampling was carried out at all stations. Salinity, temperature and nutrient data were analysed on board. Acoustic Doppler and thermosalinograph data were recorded continuously, while underway. Daily periods of 14 hr duration in which GPS fixes were available were exploited fully to obtain precise navigation data for Acoustic Doppler Current Profiles. Preliminary corrections were calculated and applied to ADCP vector plots.

100 XBT drops (type T7 Blue label, i.e. to 750 m) were made along transects half way between CTD stations.

3 ARGOS Satellite tracked drifters were deployed and one was recovered and redeployed. 6 days of sea surface and sky temperature data were acquired simultaneously with the AIMS and CSIRO infra-red radiometers. Concurrent cloud and relevant weather observations were also made.

6 Benthic samples were made using the Smith-McIntyre Grab loaned by JCU through AIMS to Mr. Correge. All grabs were successful.

Calibration backtracks were run for ADCP at the beginning and end of of part I of the cruise. Bottom tracking runs concurrent with GPS were done in the southern GBR and crossing the shelf at Cairns during part II.

AIMS RDF system was calibrated at the beginning of the cruise and was used successfully to locate drifter 7584 within range of a previous ARGOS fix during part I. Visual recovery of 7584 was necessary for recovery during part II. because the RDF transmitter was lost from the drifter.

An experimental TIP data receiver and decoder for the NOAA satellites was constructed in the ships Electronics labs. Sample data acquired using the ships RDF receiver and played back through the decoder were used to aid in system development.

Major Scientific Events :

Hydrography

Hydrographic transects completed are given in Table 1 including CTD station numbers, starting and ending date/time, and position.

Table 1

Hydrographic Transects (Part I)

	Transect			Start			End		
Tr	CTD	Date	UTC	Lat(S)	Lon(E)	Date	Time	Lat(S)	Lon(E)
a	1- 6	6/7	0352	18 28.8	147 19.8	7/7	0231	15 24.1	148 12.0
b	6-13	7/7	0231	15 24.1	148 12.0	9/7	0032	10 59.9	150 30.3
c	13-19	9/7	0032	10 59.9	150 30.3	10/7	0843	11 30.1	146 0.1
d	19-23	10/7	0843	11 30.1	146 0.1	11/7	0057	11 29.5	144 7.2
e	23-28	11/7	0057	11 29.5	144 7.2	12/7	0122	8 30.1	145 30.1
f	28-35	12/7	0122	8 30.1	145 30.1	13/7	0542	11 30.0	146 0.1
g	35-40	13/7	0542	11 30.0	146 0.1	14/7	1019	14 19.3	145 23.3
h	40-47	14/7	1019	14 19.3	145 23.3	15/7	1619	14 29.9	148 30.0
i	47-52,55-57	16/7	0826	14 30.0	148 30.0	17/7	1743	16 36.3	146 15.8

Hydrographic Transects (Part II)

j	58,53,54,59-62,59-62								
		19/7	0924	16 40.0	146 11.0	20/7	0523	16 2.1	149 4.7
k	62-65	20/7	0523	16 2.1	149 4.7	20/7	1705	14 30.1	148 29.9
l	65-74	20/7	1705	14 30.1	148 29.9	23/7	2202	11 46.4	153 58.9
m	74-89	23/7	2202	11 46.4	153 58.9	27/7	1212	20 53.6	154 16.0
n	89-94	27/7	1212	20 53.6	154 16.0	28/7	0317	21 56.9	152 52.5
o	94-105	28/7	0317	21 56.9	152 52.5	30/7	0020	16 2.0	149 5.0
p	105-116	30/7	0020	16 2.0	149 5.0	31/7	0736	19 0.3	149 1.6
q	117-123	31/7	1920	17 34.4	148 13.4	1/8	0656	18 13.3	147 27.2

ARGOS Drifter Deployments:Part I

ARGOS buoy # 7584 (AIMS) was deployed at 1630 7 July, 1990, drogued to 100 m at position 14 00.2 S, 148 59.72 E. This position coincided with a deployment of an ARGOS drifter in October, 1988 (subsequent to FR05/88). A radar mark bearing a TELONICS VHF transmitter was tethered to the buoy.

ARGOS # 6134 (CSIRO) was deployed at 1630 on 7 July, 1990 at 14 00.2 S:148 59.72 E simultaneously with # 7584.

ARGOS buoy # 7584 (AIMS) was relocated at 1200Z 16 July using a recent ARGOS fix and AIMS RDF system operating in the 150 MHz band. Final visual sighting was made by Jannick Hansen. The #7584 surface element was replaced with #7580 by attaching to original #7584 drogue element (which remained at depth during changeover). The change was made because #7580, being older, was considered expendable, whereas #7584 was wanted for redeployment during part II.

Part II

ARGOS # 7584 (AIMS) drogued to 100 m was redeployed along with ARGOS # 6145 (CSIRO) drogued to 15 m at Pivot Point No. 3, 16 01.9 S 149 07.5 E on 20 July, 1990 at 0630Z. #7584 was fitted with an experimental VHF transmitter (loaned by DSR, NZ) was well as a radar mark bearing a Telonics VHF transmitter.

ARGOS # 7583 (AIMS) drogued to 100m was deployed at position 13 22.1 S:150 32.9 E at 1222Z on 22 July.

ARGOS # 6143 (CSIRO) was deployed at the location of CTD# 83 at 0158Z on 26 July. Deployment was originally to be at CTD #81 at the expected position of the South Equatorial Current inflow, but was postponed because the drifter was not transmitting. The extra time allowed the solar cells to charge the transmitter battery.

ARGOS # 7584 was recovered after visual sighting by Ron Parrot at position 16 14.3' S, 149 2.6' E at 0715Z on 30/7/90 after a search of about 4 hours. The search was based on ARGOS fixes from 2000Z on 29/7 which were at least 7 hours old. No signal was obtained on RDF until just prior to recovery. The radar mark bearing the Telonics transmitter had been lost. The DSIR transmitter was found to be operational, but its frequency was found to be slightly out of band. Due to a scanner fault the frequency at the time of deployment was unknown. The transmitter was not heard until after visual sighting, when a systematic search revealed its actual operating frequency.

Safety Drills:

A life boat drill was conducted at 0930 EST on 6 July, 1990. A fire drill was conducted at 1030 EST on 26 July, 1990.

CTD Preparation:

An initial mid-shelf station CTD #1 was undertaken which had the dual purpose of providing a practice cast for the scientists and crew and giving an indication of hydrographic conditions on the shelf. The first slope water CTD (#2) was done near the site of AIMS long- term current meter mooring near Myrmidon Reef. A similar slope water CTD station was conducted near the site of AIMS long-term current mooring off Jewel Reef. The ADCP was running during this later station and will facilitate inter-comparison with the moored current meter records.

RDF Calibration:

This was done off Cairns 0830 hrs on 6 July, 1990. The antenna radiation pattern showed a single distinct Null in the forward direction with broad maxima on either side, as desired.

Unscheduled events:
Departure from Cairns for Part II was delayed 4 hrs due to an accident which resulted in the need for a replacement 2nd Cook.

At 1230 EST on 21 July, the bow thruster failed to retract. The ship was set to drift for 16.5 hrs while the fault was diagnosed and corrected. A further hour of steaming was required to recover position.

Approximately 3 hours were devoted in response to a request from Hobart for Depth Sounder tests to aid in diagnosing excessive noise in this system.

Selected Results:
The Clockwise circulation in the Gulf of Papua, first described by Dr. J. C. Andrews on the basis of FR05/85 hydrographic data and substantiated during FR05/88 was observed and measured with unprecedented resolution (due to the increased period of availability of GPS). Hydrographic sections show internal interface slopes consistent with the presence of the clockwise gyre and associated boundary currents. While the current pattern is qualitatively very similar to that observed in July 1988, early impressions are that the near-surface boundary currents are not as intense as previously observed.

Additional features which were not observed on earlier cruises were a westward jet in slope water near the east central PNG shelf and a more seaward eastward current, flowing against the prevailing trade winds (the eastward boundary current was evidently separated from the coast). A possible link with reported observations of a South Tropical Counter Current would be worth investigating, since the source of that current has never been reliably identified.

The continuity of the northern branch of the SEC bifurcation near Cooktown as a continuous boundary current, flowing along the continental slope northward around the Gulf of Papua and eastward along the Southern PNG slope, is now established. Evidently the Clockwise Gyre is a persistent (at least winter-time) feature of the Coral Sea since it has been observed in whole or in part using variously hydrographic, Acoustic Doppler and Lagrangian drifter data in 1985 (AIMS RV **Franklin** cruise), 1987(RV **Oceanographer**, TEW1),1988 (RV **Franklin** BROBS) and now during 1990. Coral Sea Boundary Current (CSBC) and the associated Coral Sea Gyre (CSG) are suggested as names for these persistent features of the winter-time circulation.

The summer-time regime remains to be described perhaps with the aid of data from past and future satellite altimetry missions in conjunction with ground-truth data from RV **Franklin**. Near-surface flows in the presumed bifurcation area off Cairns were weaker than anticipated. This was revealed by ADCP velocities slower than 0.25 m/s and by a poor signal to noise ratio related presumably to recently degraded GPS

precision. The trajectory of Drifter # 7584 deployed in the bifurcation zone (Pivot Point 3) and drogued to 100m revealed no consistent drift during part II. Surface drifter #6134 drogued to 15m revealed only a weak westward drift during the same period.

An impression that the circulation is less intense this year than was the case in 1988 will be confirmed by comparing the ADCP transects between Jewel Reef and Osprey Reef from the two cruises. This aspect will be investigated by analysis of the data from AIMS long-term current meter mooring located on the slope seaward of Jewel Reef. Toward the end of the long leg south (Segment "m") a strong easterly component in near surface flow was revealed by the ADCP just north of Frederick Reef. Subsequent ADCP data obtained while crossing from Frederick to Saumarez Reef revealed a consistent rotation toward the south-east as the presumed mainstream of the EAC was approached seaward of Swains Reefs. It thus appears that the strong eastward flow near Frederick Reef is derived either from a zonal eastward branch or local meander of the EAC. It is notable that Japanese fishing fleets have reported strong easterly drifts at times in the vicinity (D. Williams, personal communication). The AIMS RV **Franklin** cruise scheduled for September, 1991 should provide an opportunity to study this phenomenon in more detail.

A cool northward flowing counter current trapped between the EAC mainstream and the Swains reefs was revealed by lower SST and a northward set in ADCP data on the upper slope (less than 200m deep) waters. The transect north back to Pivot Pt. 3 from the Swains Reefs again revealed relatively weak flows, predominantly, but not exclusively, south westward seaward of the shelfbreak over the broad Marion plateaux.

Isopycnal slopes plotted in the CTD section across the (locally) 400m-1000m deep Townsville trough (located along the southern flank of the Queensland Plateau) are consistent with strong inflow toward the west over this depth range. It is speculated that this flow may be a source for the EAC undercurrent reported earlier in the Queensland trough by Church and Boland (1983, AJMFR, v 38, pp. 671-683). To investigate this possibility two detailed hydrographic sections were planned and executed across the Townsville trough (along 149E) and across the Queensland trough between Myrmidon and Flinders Reef. These should provide an opportunity to compare the estimated volume fluxes through the two sections.

Problems and Suggestions:

Both continuously recorded (and calibrated) meteorological data and CTD casts to the bottom were requisites of the research program for FR0690. Unfortunately, the existing met station was replaced with new uncalibrated equipment for this cruise. The software intended for logging the data from the new system could not be made to work during the first part of the cruise. The problem was finally tracked down to an

incorrectly set baud rate and was remedied in time for the commencement of part II. This is potentially a serious loss of data which was needed particularly to complement the infra- red radiometer work with the Barton radiometer during part I. By 20 July the meteorological sensors, though uncalibrated, were giving sensible looking readings. The CSIRO technician advised that there are plans for post-cruise calibration of the sensors used.

Due to cable faults CTD casts were limited to a maximum depths of 4000m with the consequence that several casts could not penetrate to the bottom. Consequently geostrophic velocities contributing to the volume transport of the Coral Sea cannot be calculated at depths greater than 4000 m. The chief scientist was not informed of these problems until after the cruise had commenced, although CSIRO staff were evidently aware of them before hand. It is important that in the future the chief scientist be advised of essential equipment problems such as the above well in advance of the cruise so that remedial steps can be taken and alternative observational strategies considered.

Acoustic Doppler Data acquired in the south western and central region of the part 1 domain appears noisier than data acquired elsewhere. This problem has not yet been resolved although it may be due to the presence of weaker currents in certain regions with a consequent lowering of the signal to noise ratio. CSIRO personnel alerted the Chief Scientist prior to the cruise of possible degradation of GPS data quality (beyond CSIRO control). This was useful knowledge which is being taken into account in assessing the quality of the Acoustic Doppler Data.

The surface thermosalinograph appeared to produce sudden jumps in salinity and the cause needs to be identified. Early difficulties were experienced providing adequate power to the compressor used to provide air purge to the radiometers. This problem resulted in circuit breakers being thrown. The problem was remedied by the Electrical Engineer who made available a more appropriate source of electrical power. With the exception of the above, all data acquisition systems appeared to run well and good quality data were obtained.

Conclusion and Acknowledgements:

I consider this a very successful cruise and wish to thank the Captain and crew and all the ORV Personnel for their dedication and cheerful and willing response to all requests for assistance. The ship was well suited to the task and, considering the complexity of the scientific data acquisition systems, data logging proceeded efficiently and effectively. Recent enhancements to the display of the ADCP data were especially useful, in this regard. Special thanks to Dave Vaudrey and his team for helping make the cruise both successful, scientifically and enjoyable.

PiggyBack and Ancillary Projects:

Geochemistry of living Ostracod Shells for use in Palaeoceanography

Thierry Correge and Patrick De Deckker,
Dept.of Geology,
ANU PO Box 4 Canberra ACT 2600 Telephone (06) 2494303

Objectives:

To collect living benthic ostracods from different water depths. By knowing the physico-chemical properties of the water, we will then analyse the ostracod shell for several elements (e.g. Sr and Mg), and thus relate shell chemistry to water chemistry. This work is primarily designed to enlarge the database we already have concerning the relationship between the temperature of the water and the Mg content of ostracod shells. We also want to test an hypothesis concerning the link between O2 content of the water and the morphology of the carapace of the ostracod genus *Krithe*.

The goals in part I of cruise FR06/90 (6-18 July, 1990) were to collect deep-sea sediments using a Smith-McIntyre Grab, as well as water samples and physico-chemical properties of the water. The success of the operation went beyond my expectations, and overall, I was able to collect 6 grab samples from selected sites. In these samples, the ostracods, and possibly pteropods when present, will be used for geochemistry work. I hope to demonstrate that a direct relationship exists between the temperature of the water and the Mg content of the ostracod shells. Some additional work will also be carried out on the use of the ostracod genus *Krithe* as tracer of the dissolved oxygen in sea water. I also collected 6 water samples from depths ranging from 50 m to 2000 m, for Rare Earth Elements analysis, and their possible use as water mass tracers. The samplings were done at the following stations:

CTD	Date	Lat(S)	Lon(E)	Grab	Depth(m)	Tb(C)	D.O(ml/l)
# 6	7/7 0100	15 24.1	148 12.0	#1	1115	4.179	3.61
#12	9/7 1930	11 17.1	150 20.9	#2	2023	2.293	3.25
	Plus water samples for R.E.E analysis from 750m and 2000m						
#23	11/7 0000	11 29.5	144 7.2	#3	792	5.866	4.12
#29	12/7 0323	8 44.3	145 34.6	#4	950	5.036	3.85
#34	13/7 0030	10 58.3	145 59.9	#5	1478	2.947	3.16
#43	14/7 2207	14 24.0	146 27.0				
	Four water samples for R.E.E analysis from 50, 300, 750 and 1500m						
#49	16/7 0630	14 49.9	148 8.1	#6	1260	3.570	3.41

Acknowledgements:

I am indebted to Derek Burrage for allowing me to participate in this cruise and for giving me a lot of his time to make sure everything went alright. I thank AIMS and the

Dept. of Marine Biology, JCU, for the loan of the Grab. Very special thanks go to the captain and crew of the RV Franklin, to the people from CSIRO Oceanography (especially, Dave Vaudrey), and AIMS for great help during the cruise.

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Infrared Radiometry Project

Conducted by William Skirving with Mike Bonnell (JCU) and Derek Burrage (AIMS).

Aims:

There were three main aims of this project:

(i) To monitor the sea surface temperature (SST). This data base will be used as a supplement to the other oceanographic data collected during the cruise (eg CTD, XBT, etc.). It will also be used as ground-truthing data for SST retrieval from NOAA/AVHRR data.

(ii) To conduct inter-comparisons between narrow and wide band radiometers.

(iii) To continue the on-going development of the radiometer system for SST monitoring.

Instrumentation:

Two radiometer systems were used in this project. The AIMS radiometer system consists of two commercially available 8-14 micron radiometers, one with a 4 degree field of view (deg. FoV) and the other with a 15 deg. FoV. They were made by Everest Inc., California. The other radiometer was designed and built by Dr Ian Barton at the C.S.I.R.O. D.A.R. This radiometer is capable of sensing in three different windows, 10.5 to 11.5 micron (NOAA band 4), 11.5 to 12.5 micron (NOAA band 5), and a very narrow band centred on 12 micron.

Implementation:

Due to problems setting up the data loggers (two DATATAKER 100s and one DATATAKER 200) the radiometers were not logging SST until 12th July. By this time the Barton radiometer and the 4 deg. FoV Everest radiometer had been positioned side by side above the bridge on the starboard side of the ship, and were logging SST values simultaneously. Unfortunately the 15 deg. FoV Everest radiometer was not operational at this point. The Everest radiometer was mounted in a PVC tube and equipped with an air purge as protection from sea spray. The compressed air was supplied to the radiometer by a portable compressor, which was originally positioned on the after deck and connected to the radiometer via a 40m long high pressure hose. The regulator was positioned near the radiometers for ease of use, and a container of silica gel was placed between the regulator and the radiometer. Although the silica gel was being changed once a day, we had problems with water getting into the radiometer. This was obviously related to high atmospheric humidity. The problem was eventually

overcome by placing the compressor (and hence its air intake) into the portable lab on the after deck of the ship. The lab is equipped with air-conditioning, which removed much of the water-vapour from the air before it was compressed and blown through the radiometer. This approach decreased the amount of water in the system, enabling the silica gel to prevent the remainder from getting to the radiometer.

Data Collection:

Part I (6th to 18th of July)

Throughout the first leg of the cruise, the Barton and Everest radiometers were pointed in the same direction, so that intercomparisons could be made at a later date. Data was collected almost continuously between the 12th and 18th of July. Most of these data were of SST, with a small amount of sky temperature data interdispersed. The data included use of all three of the Barton radiometer's filters. Data on the effects of radiometer angles were also collected during some of the CTD stations.

While these data were being logged, a new data collection system was developed for use on the second leg of the cruise. This system consisted of revised software which would be controlled via a number of switches located near the radiometers. These switches enable the user to control the data logging program from near the radiometers, rather than having to run down to the operations room to start the logging after having set the viewing directions of the radiometers. At the end of part I, the Barton radiometer had been returned to Aspindale, and thanks to the help of John Soles (AIMS technician) and Phil Adams (CSIRO technician), the switches were made, the 15 deg. FoV Everest radiometer was repaired and the new program was written.

Part II (19th July to 2nd August)

Within half an hour of leaving Cairns SST was being logged, however by 1pm the next day, the 15 deg. FoV Everest radiometer failed. Fortunately, only an unplugged connection within the radiometer was at fault, and the new system was soon running again.

All problems with the new system were ironed out and SST was being logged by 12:09pm on the 22nd July. Continuous SST and sky temperatures have been logged for the period 22nd July to the 1st August. Other data (usually collected during a CTD station) have been acquired in order to investigate problems of measuring angles for SST retrieval, inaccuracies due to the motion (rolling) of the ship, the effects of the wake on SST, and the differences between 4 and 15 deg. FoV measurements of the sky temperature. Little can be said about the results until after post cruise calibration. Preliminary findings suggest that the intercomparisons between narrow and broad band radiometers are favourable, which would suggest that the use of non-specialised commercial broad band radiometers can be used to ground-truth satellite data. An improvement to the radiometer system would be the inclusion of an inclinometer so that changes to the radiometer's viewing angle relative to the sea surface could be logged.

Unfortunately, due to the large amounts of cloud during most of the cruise, the SST data collected during this cruise maybe of little value for ground-truthing coincident satellite overpasses, although three overpasses towards the end of the cruise (on the 29th and 30th July) were clear.

Acknowledgements:
I would like to thank Dr Ian Barton for allowing me to use his radiometer on the first leg of this cruise. I would also like to thank the entire Franklin crew (including the CSIRO technicians) for their invaluable assistance. I have enjoyed their attitude toward my project, and the science in general, it has been a pleasure to work with them.

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ORV Services Reports

Electronics Technicians Report

P. Adams,

A.D.C.P.

Prior to the cruise the ADCP trolley was re-galvanised. This was reassembled and fitted.

C.T.D.

During the first 20 casts there was an intermittent loss of signal due to bad slip ring contact. The problem disappeared for the rest of the cruise. Item to be overhauled on ship's arrival in Hobart. The Altimeter failed,the suspect logic board was replaced with the spare,which had been modified and also found to be faulty. The altimeter off CTD No4 was used as a replacement. The Oxygen sensor was replaced,2 new sensors to be ordered.

THERMOSALINOGRAPH.

The temperature traces for both temp sensors were erratic. The unit was removed and the cards cleaned. The unit then functioned correctly.

INTECH SAT-NAV.

The screen on the Intech became unreadable due to apparent loss of horizontal sync. Large amounts of dust were removed from the boards and backplane connectors. The unit was reassembled and worked for a further week before failing in the same manner. The CRT monitor was removed and cleaned. This removed the fault for the rest of the trip.

AUTO ANALYSER.

The Auto Analyser data logger failed to boot from the hard disk. The problem was traced to a faulty idc connector on the disk drive lead. The lead was re-terminated and gave no further problem.

MET STATION.

The new solar radiation sensors were fitted to the top of the mast prior to the cruise along with the sensor washing system. The old housing for the Rimco pressure sensors

was removed from the mast,the sensors removed,and the housing refurbished. The new Rotronic sensor was installed. The water pressure at the top of the mast is insufficient to wash the sensors in a wind in excess of 8 knots. An inline pump will have to be installed for complete washing.

COMPAQ.

The Compaq color monitor was installed and the hard disk was backed up on 360k floppies.

HYDRO WINCH.

The broken sensor for the payout metering system was replaced, again the sensor provided by Veeder Root was incompatible. (Veeder Root say it's the only replacement they have listed) The sensors were swapped around to give distance out rather than rate on the bridge meters.

FLUOROMETER.

The Fluorometer battery case was strapped to the Rosette frame and lowered to 2000 meters. It showed no signs of leakage.

EK400.

Noise measurements at 12KHZ were carried out on the EK400 as per SIMRAD's request,the results were posted to Hobart from Cairns. The same tests were carried out at 120KHZ and the results are included in this report. Impedence and insulation tests were carried out on the 12KHZ transducer,these results are also included.

MICRO 6.

Micro 6 failed with a clock error. The clock board was replaced with a spare. The power supply cable was also replaced due to bad oxidisation of one of the clock input pins. The remaining spare board was faulty.

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COMPUTING REPORT

Jan Peterson - Dave Vaudrey - Bernie Baker

1. MET Logging.

The new MET station was installed for this cruise and Bob Beattie's METLOG was started at the beginning of a cruise. A new METLOG.OPT was installed to enable logging of a range of new sensors installed on to the Met Station. Well into the second week of the cruise it was discovered almost accidentally that the met data was not being logged. We had been led to believe that the data would not be transferred around the network and that the data would not be available on DELP. It was discovered that the original .MET file which had been opened when the MET had been initiated was still waiting patiently for data and not a complaint was to be heard. Various 'fixits' were attempted, the cures usually causing more problems than the disease. (see notes on terminal program).

After swapping TX/RX on the incoming data stream at least 'Bad Data' was reported. After an attempt to swap terminal ports, thinking that TT14: was U/S it was found that

TT14: is set at the wrong baud rate (2400:2400 not as required 9600:9600) during startup and during any subsequent startup. Once this was corrected data began to appear to be logged, copied to the VAX and to appear on DELP. Still some minor problems appear, ie the correction of Wind Speed and Direction appears to drop out inexplicably only to be recommenced by stopping logging and immediately re-starting logging. Calibration of the sensors and logging coefficients is required.

2. TERMINAL Program TERMC

A new utility written as a logging diagnostic aid was installed on Micro 1 during an attempt to examine the MET logging problem. Its function is to be able to examine the data steam coming in at any terminal port to see, for example, if that stream contains realistic data. It starts up OK but when an attempt to examine the desired port is made from the console it locks up the console before even all the input parameters are entered and only a reboot would regain console control. Attempts to use a terminal on the DECNET server to run the utility would result in a failure of DECNET to allow communications.

3. XBT Contouring Program

JLP created a "quicky" XBT sectioning program which can be run from any user account. It is named XBT_CONTOUR and can be found in [PETERSON.FR0690]. Further development is required:

-The cruise ID should be input (at present it is fixed as FR0690).

- only rough data rejection criteria are used.
- as there is no preprocessing of XBT data, it is not consistent with the normal CRUISUTIL utilities.
- very broad interpolation is used. -- 5km by 10m.

4. ADCP

A program named PLOT_VARS, also in [PETERSON.FR0690], was created to plot time series of 9 ADCP parameters. At present it reads data files in their logged format but could perhaps,with modification, be useful in the CRUISUTIL suite.

5. MET data plotting program.

A small program to plot a single days met data was written and inserted into [CRUISPROG.UNDERWAY]. This can be operated from [CRUISUTIL.UNDERWAY] by typing:

$ METPREP

followed by

$ METPLOT

and answering the prompt for the required day. The Format is dd-MON-yy, where

dd = day of the month

MON = 3 character Month designation (Upper or lower case)

yy = Year -1900 or in the unlikely event that it is still being used past 1999, the year - 2000.

A single frame is plotted on the ZETA with all 14 parameters automatically ranging inside preset maximum limits. The output file is FOR002.DAT and the data file MET.MET is copied by METPREP from F.MET from [CROOKS.CRUDAT]. Each METPREP purges MET.MET and deletes old FOR002.DAT files each time it is run.

6. MICRO 6.

Micro 6 failed during the last week of the cruise but Phil Adams was able to carry out repairs. See Electronics report for details.

7. CTD Sectioning programs.

CTD sectioning programs where treated with caution following earlier reports that they did not do as one expected, particularly with respect to defining station numbers. No problems where encountered. One might suspect cerebral lockup or other associated "software"/user interface problems.

8. VAX.

At one stage all the terminals except one on the DECSERVER to the VAX locked up. This seemed to rectify itself once the myriad of sessions that had been built up on a couple of machines had been removed. A short while later it was found that the fault light on the USER$DISK had been lit up and no access could be gained to any directories on the disk. It seemed OK following depression of the FAULT light and a REBOOT. No Temperature associated powerdowns occurred and the alarms only actuated twice, both times at startup where the Air Conditioning had been left running with the VAX off and the air intake frosted up. The problem cleared after a short while.

Disk size is getting to a point where it may become strained particularly when GPS is fully operational and JLP is on the cruise. At times we were down to less than 50 thousand blocks on USER$DISK. This could have been embarrassing if it overfilled during EXABACK (ie one ADCP tape)

9. High Resolution map.

The high resolution map resident on the VAX has not got PNG on it or any of the Islands surrounding the Coral Sea for that matter.

10 Gyro.GPG Data.

GPG data is not logged or prompted to be turned on and was not described in documentation until the Cookbook was updated during the cruise and could be easily missed.

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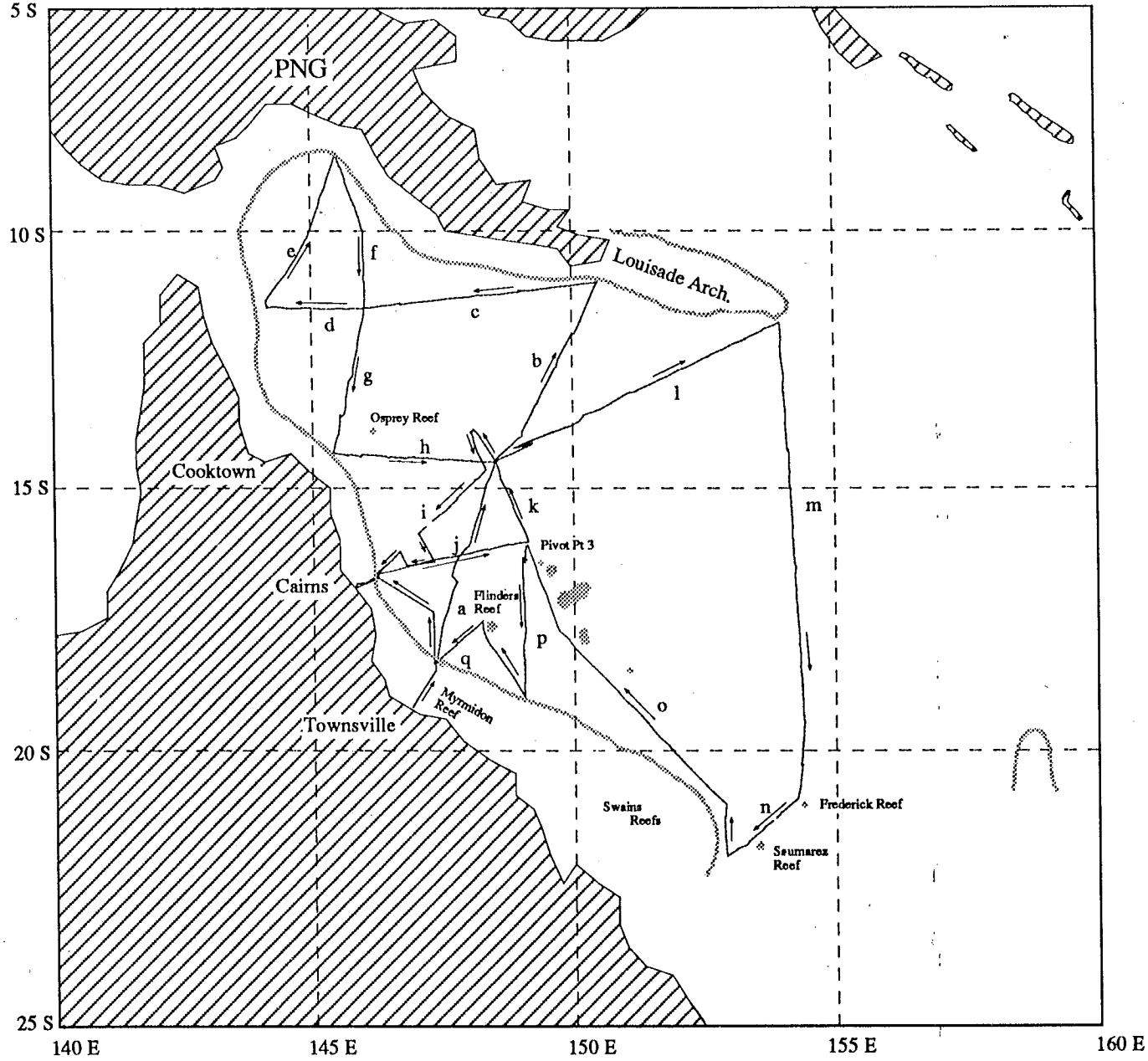

Cruise Track
Figure 1