

R.V. FRANKLIN

NATIONAL FACILITY

OCEANOGRAPHIC RESEARCH VESSEL

CRUISE SUMMARY

R.V. 'FRANKLIN'

FR 10/86

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R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

RJE/BB

13 February 1987

CRUISE SUMMARY

R.V. FRANKLIN

FR 10/86

Itinerary

Departed Launceston	0600 hrs	Tuesday	9 December
Arrived Hobart	0930 hrs	Friday	19 December

Scientific Program

1. Survey of benthic invertebrates from the Continental Slope of eastern Australia.
2. Pilot study of the circulation of the Tasman Sea.
3. Development of programmable profiling water sampler.
4. Geomagnetic deep sounding of the ocean-continent transition zone.
5. Observations on seabirds.

Scientific Personnel

PROGRAM 1

W.F. Ponder	- Australian Museum
P.A. Hutchings	- Australian Museum
R. Springthorpe	- Australian Museum

PROGRAM 2

F. Boland	- CSIRO (Cruise Manager)
M. Rayner	- CSIRO
E. Madsen	- CSIRO

PROGRAM 3

P. Lindgard	- Sydney University
N. Tremanan	- Sydney University

PROGRAM 4

A. White - Flinders University
P. Lilley - ANU

PROGRAM 5

D. Close - Flinders University

Outline of Cruise and Report of Program One

RV FRANKLIN departed Launceston in excellent weather at 0610 hrs on the 9 December 1986 and with several additional personnel on board. After a brief test of some of the ship's functions the additional people were dropped off at Bell Bay. We then proceeded to the first station on the first transect of Program 1, on the slope off Banks Strait. By this time the weather had deteriorated considerably but sampling was possible.

Transect 1.

At the first dredge station (2200 hrs, 40°40'S, 148°47'E, 280-350 m) a good sample was obtained. At the second station (10 December, 0005 hrs, 40°41'S, 148°54.1'E, 666-750 m) the dredge was lost on what is assumed to be a hard bottom. At the third station (0325 hrs, 40°41.3'S, 148°56.1'E, 880 m) the dredge was recovered after being on a rough bottom but had a torn net and no sample was obtained. A PPE station was made at 0800 hrs, followed by a CTD. Stations between 1000-1200 m were not undertaken because of adverse bottom conditions. The fourth station (40°45.94'S, 149°01.62'E, 2500 m) using a benthic sledge, was successful with a good sample being obtained.

We then steamed to the second transect off Eden, progress being hampered by heavy seas. Fortunately the weather improved in time for the sampling on the second transect.

Transect 2.

At the first station (Stn 5, 11 December, 2125 hrs, 37°00.2'S, 150°20.1'E, 250-300m) the dredge obtained a good sample. The haul at the second station (Stn 6, 2218 hrs, 36°57.4'S, 150°21.20'E, 716-900 m) was also successful. A very large sample of mud and siltstone was obtained at the third dredge station (Stn 7, 12 December, 0130 hrs, 36°57.95'S, 150°22'E, 960-1050 m). A CTD station (0300 hrs) followed by a PPE station (0520 hrs) were then carried out. At the fifth benthic station (Stn 8, 0645 hrs, 36°56.2'S, 150°23'E, 1600 m) the benthic sledge obtained a small but interesting haul. The sixth station (Stn 9, 1100 hrs, 36°57.10'S, 150°23.40'E, 2000 m), using the sledge, resulted in a small sample of animals. At the seventh station on this transect (Stn 10, 1506 hrs, 36°57.75'S, 150°28.37'E, 3300-3500 m) a very small sample was obtained by the sledge. In this case, and the other deep samples, the sediment is mostly fine silt/ooze which is washed through the fine mesh of the bag containing the sample on its ascent. The resulting sample comprises almost entirely biological material. A repeat station was carried out using the dredge (Stn 11, 2000 hrs, 37°05.65'S, 150°28.22'E, 3100-3250 m) and a small sample was obtained.

The ship then steamed to the first of the locations for the recovery of Program 2 samplers. This was a slight deviation from the cruise plan, made possible by good weather, to allow more time for Program 3 samples. The recovery was completed by 1000 hrs (13 December) and then steamed to the first of the Program 4 stations to recover recording equipment using a time-release mechanism at 1530 hrs. The weather and sea was excellent for this recovery, and the others that followed at 1930 and 2330 hrs.

A CTD and PPE (Program 3) drop was made at 1800 hrs on the 14 December en route to recover the second water sampler (Program 2) in the mid Tasman. The weather continued to hold and good time was made, arriving on station at 0430 hrs on the 15 December with the recovery completed by 1100 hrs.

Because of the good weather the cruise was running ahead of schedule and a small deviation was made in the cruise plan to allow benthic sampling on a plateau to the east of Tasmania. CTD and PPE (Program 3) drops were made at 1100 hrs on 16 December. We reached the first of the plateau stations at 2035 hrs (16 December, Stn 12, 43°31'S, 149°58.75'E, 2780 m) and recovered a small but interesting sample using the benthic sledge. A repeat sample (Stn 13, 0300 hrs, 43°34.05'S, 149°52.46'E) was made and completed by 0620 hrs on 17 December. We commenced steaming to transect 3 and shortly after the weather deteriorated considerably.

Transect 3.

The weather moderated sufficiently in the morning of the 18 December to commence transect 3. The sledge was lowered in 3000 m at 1145 hrs (Stn 14, 44°20.08'S, 147°55.68'E) and by the time it was completed (4 hours later) the wind was gusting over 40 knots and a heavy swell was running. Another low was approaching and there was clearly no possibility that further sampling could be carried out for the next 24 hours. It was decided that the cruise should be terminated as there was obviously no way that conditions would enable further sampling in the remaining time available.

We arrived in Hobart at 0930 hrs on 19 December.

Program 1 was clearly not successful as it might have been because of bad weather preventing all but one of the transect 3 stations to be carried out. In addition the hard bottom of much of transect 1 resulted in this being largely unsuccessful. The deep-water samples were mostly very small but rich in animals that will, undoubtedly, be largely undescribed and many collected for the first time. Larger equipment than the equipment we used can be deployed on the Franklin and we will do this in future cruises to maximise the return.

This cruise was short (11 days allocated) with 4 programs requiring sea time and a very large amount of steaming time. Benthic sampling programs, to be effective, require a lot of station time and flexibility so that short spells of bad weather do not destroy the program. During this cruise most of the period of good weather was spent underway in the middle of the Tasman. Another complication was that one program (Program 3) originally requested 8 hours station time but a few days before the cruise commenced requested 24 hours or more. Fortunately this additional time was able to be slotted in because of time savings in steaming time.

I would like to express, on behalf of all the scientific personnel, thanks to the master and ship's company for their support, co-operation and companionship during the cruise.

Report of Program Two

The two moorings installed for G. Meyers in June were recovered without incident. One of the current meters on the outside mooring leaked and there is no record from it. The data from the seven other instruments have been processed and edited.

Report of Program Three

This was the first operational test of both the PWS* and the SS** at sea. Four largely successful descents were made of the PWS to depths in the range of up to 500 m. Samples were collected at depth intervals from 5 m to 10 m, being stored temporarily in the collecting coil of the sampler and returned to the surface. Sample recovery measured in terms of the numbers separated, against programmed for collection, varied from 37% to 100%. The samples were separated off-line from the sampler in the Wet Laboratory of the RV FRANKLIN.

The new SS performed up to expectation, giving recovery of samples above a certain minimum volume. Sample loss represented by the variability of % recovered was mainly caused by initial variability of sample size; those samples insufficiently large enough for detection by the SS, being counted by the separator module. Great care is necessary in controlling the outflow of the sample train at separation time and the very low recovery % for Drop 2 is explained by user inexperience with this new tool.

Owing to the need for great care in assuming no carry over of silicone oil to the autoanalyser system aboard RV FRANKLIN, sample analysis was confined to nitrate for Drop 2. All traces of oil were eliminated from the samples by employing a final filtration at the point of sample transfer to the autoanalyser vials. A problem was known to exist, because of Rhodamin residue carry through from its use as a bubble marker in the PWS. Subsequent flushing of the PWS led to improved results in this respect and the data from Drop 3 were completely analysed for nutrients using the autoanalyser. The samples from each drop will also be analysed for salinity using the microsalinometer at Sydney University.

The remaining sample size variation correlated with the variation of pump cycle time on the PWS and the most likely explanation is water ingress to the air motor exhaust port, leading to variable restriction of air outflow and thus pump cycle time. This problem could be rectified by providing improved seals and sorkel on the air exhaust chamber, making an effective air lock. The problem occurring on earlier cruises whereby sample size diminished to virtual zero below about 200 m, has been overcome by using intake filters of larger pore size.

Drops 5 and 6 were made as pure equipment trials in an attempt to reduce the sample size variability. Drop 5 was marred by too rapid deployment by the winch controller, however water still found its way into the air exhaust system. Drop 6 failed totally owing to the disintegration of a solenoid valve in the water control system. This occurred at an operating pressure below its

manufactured maximum rated pressure and resulted in flooding, by oil, of the hydro-pneumatic control and computer cannisters on the PWS. This eliminated the sampler from further trials on the last day of the present cruise.

In summary, this was a highly successful cruise which confirmed that the new water sampler and sample separator is a viable retrieval system for high density chemical oceanographic data collection. However, the collection of 100 samples at 5 m intervals in a single deployment of 65 mins is a world first for chemical data recovery, marred only by random variation of the sample size which it is felt can be easily overcome by the use of better seals on the air exhaust side of the air motor pump.

* Programmable Water Sampler

** Sample Separator

Report of Program Four

The three ocean bottom magnetometer packages deployed on Cruise 5/86 were all successfully recovered. At the first site closest inshore (35°43.6'S, 150°33'E) the magnetometer was in 140 m of water. Its pretimed release had been set to activate at 1525 Eastern Daylight Time (0425 U.T. 13 December 1986) and the magnetometer surfaced at 1529, only 100 m from the ship where it was immediately sighted and recovered in very calm seas. At the second site (35°45.6'S, 150°44.9'E) the magnetometer was in 2240 m of water. Its release had been set to activate at 1847 E.D.T. and it surfaced at 1928 E.D.T. (0828 U.T. 13 December 1986). RV FRANKLIN was about 1 nm off station and the radio beacon signal (27 MHz) was used to guide the ship close to the package for sighting and recovery. Seas were again calm and the magnetometer was recovered without difficulty. At the third site (35°48'S, 150°55.4'E) the magnetometer was in 3380 m of water. Timed to release at 2227 E.D.T. it surfaced at 2330 (1230 U.T. 13 December 1986) about 300 m ahead of the ship. The flashing light and the radio beacon were both instantly perceived and the magnetometer was quickly recovered, again in very calm seas.

Two magnetometers showed full cassette tape transport and appeared to have worked perfectly, while the third showed 60% tape transport. It is hoped that this magnetometer will have recorded 2 months of useful data before malfunctioning. The magnetic variation data from these three sites will complement that obtained on the much larger ocean-continent transect occupied in the Tasman Project of Seafloor Magnetotelluric Exploration of Drs F.E.M Lilley (Research School of Earth Sciences, ANU), and J.H. Filloux (Scripps Institution of Oceanography, La Jolla, Calif., USA). The objective of these studies is to determine the electrical structure of the lithosphere and asthenosphere along an ocean-continent transect by the magnetotelluric sounding method.

Report of Program Five

The purpose of my voyage was to collect evidence of the distribution and relative abundance of seabirds, especially Procellariiformes, in the Tasman Sea in December. This is part of an unco-ordinated series of surveys by amateur ornithologists, interim results of which are being published in various journals, such as the Australasian Seabird Group Newsletter. Final results will be incorporated in the projected handbook of Australian birds that is being prepared by the Royal Australian Ornithologists Union.

Counts of seabirds were made by myself and Neil Cheshire. Each count lasted for about an hour. The counts totalled an average of six hours a day for 11 days, from 9 to 18 December. In addition, a lookout was maintained for an average of about two more hours per day. Details were noted of latitude and longitude, temperature and salinity of surface water, and (when available) depth of sea.

Thirty-five species of oceanic bird, and one species of shorebird, were identified during the trip. Among more interesting observations were: an unusually large number of observations of Buller's Shearwater (recorded in 15 places in all parts of the voyage), and large numbers of Little Shearwater. Also of special interest were, respectively, a northerly record of Providence Petrel; the total absence of records of Royal Albatross or of adult Blackbrowed Albatross or of Cape Petrel, and the absence of southerly records of Goat-winged Petrel.

W.F.P.

W.F. Ponder
(Chief Scientist)

F.M. Boland

F.M. Boland
(Cruise Manager)

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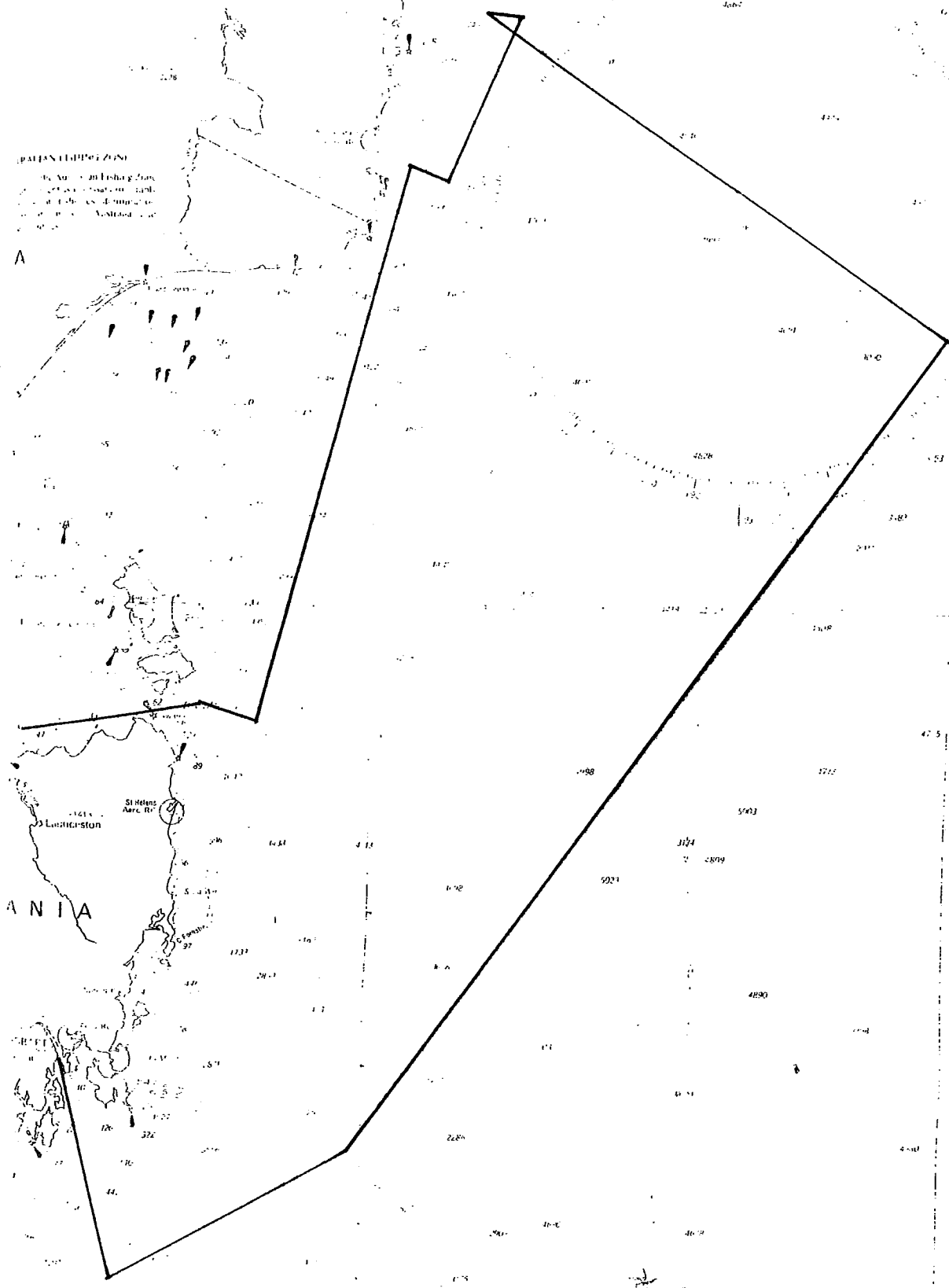
SOUTH

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(PARTS) FISHING ZONE
 The Area is an Fishing Zone
 established on the basis
 of the Fisheries Management
 Act 1976. Australia
 1976.

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