R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

RESEARCH SUMMARY

CRUISES FR 2&3/90

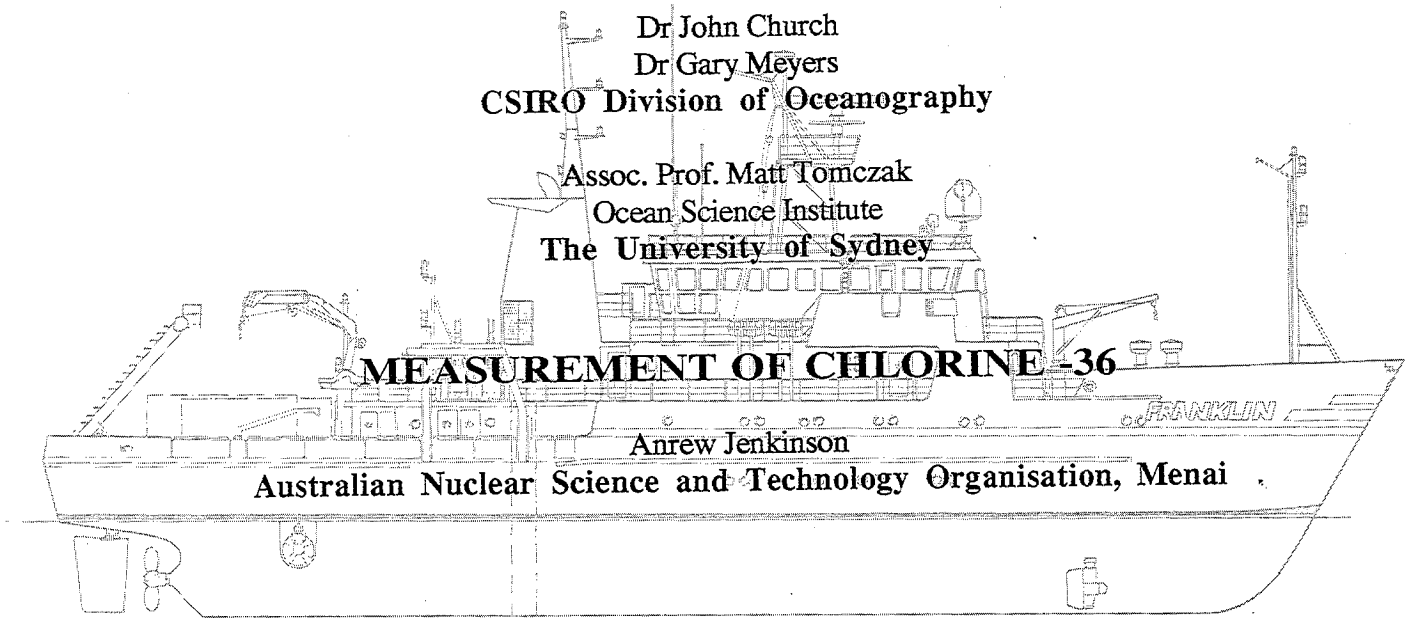
Sailed Hobart	1115Hrs Mon 26 February 1990
Arrived Brisbane	0800Hrs Mon 19 March 1990
Sailed Brisbane	0910Hrs Tue 20 March 1990
Arrived Newcastle	1100Hrs Sat 7 April 1990

OCEAN TRANSPORT IN THE TASMAN SEA

Principal Investigators

Dr John Church
Dr Gary Meyers
CSIRO Division of Oceanography

Assoc. Prof. Matt Tomczak
Ocean Science Institute
The University of Sydney



MEASUREMENT OF CHLORINE -36

Anrew Jenkinson
Australian Nuclear Science and Technology Organisation, Menai

19 April 1990

For further information contact

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AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

Cruise Summary
R.V. Franklin
FR2-3/90

Itinerary

Departed Hobart:	1115Hrs	Monday, February 26, 1990
Arrived Brisbane:	0800Hrs	Monday, March 19, 1990
Departed Brisbane:	0910Hrs	Tuesday, March 20, 1990
Arrived Newcastle:	1100Hrs	Saturday, April 7, 1990

Scientific Objectives

OCEAN TRANSPORT IN THE TASMAN SEA

1. To estimate the volume transport (and its time variability) of the EAC along the east Australian coast and in the Tasman Front using CTD, ADCP and current meter moorings.

2. To determine the large-scale general circulation of the Tasman Sea using patterns of tracers (temperature, salinity, oxygen and nutrients) and of density to estimate geostrophic circulation.

3. To determine temporal changes in surface pressure gradient between two points on the Lord Howe Rise, one at 28°S and the other at 38°S using two independent methods (steric height estimate and GEOSAT altimetry).

MEASUREMENT OF CHLORINE-36 (Piggy-Back Proposal)

1. To collect samples for analysis for Chlorine-36 at four latitudes and at several depths.

Principal Investigators

OCEAN TRANSPORT IN THE TASMAN SEA

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MEASUREMENT OF CHLORINE-36

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Menai, NSW, 2234.

Cruise Narrative

The completed cruise track for FR2-3/90 is shown in the attached figure.

FR02/90

The ship left Hobart three hours late because of problems with the VAX which were fixed by the DEC maintenance engineer. The first CTD station was commenced at 1730 and then we proceeded east along 43° 15'S. At the third station samples for Chlorine-36 were taken.

Duplicate samples were taken at depth to test for bottle leaks and two nutrient samples were taken from each bottle (one filtered and one unfiltered) to try and determine the cause of the variability in the nutrient concentrations observed on FR10-11/89. Some samples were also analysed without freezing.

The CTD wire snagged on a protruding screw at 4,800 m on one station and a single strand was broken. After this, 3 CTD stations were not taken right to the bottom during FR02/90. The 43° 15'S section was completed on Monday March 5.

The section north from Cape Reinga was commenced on March 8. This section was finished and the 28° 15'S section commenced on Sunday, March 11. This section was finished at Evans Head on Sunday March 18 and then we steamed to Brisbane.

Tony Worby completed his special XBT program.

All of the chlorine-36 samples were collected.

Mostly good weather was experienced except about a day was lost because of bad weather associated with ex-cyclone Hilda.

FR03/90

Franklin left Brisbane at 0910 and after letting off the pilot steamed south to the first mooring. A southerly wind slowed our progress but overnight the wind eased and the swell moderated. The first mooring was on deck at 1100 March 21. The top current meter was full of water and there was a G-clamp missing. The second mooring was on deck by 1530 and the third 1930. We then steamed west to the coast doing an ADCP section overnight before starting mooring work again tomorrow morning.

On Thursday morning, March 22, mooring recoveries went well. The spindle of the top current meter on the 500 m mooring was broken so we lost that current meter and the near-surface flotation. The 40 m isobath mooring was north of its correct position but was recovered. The 60 m isobath mooring was not responding. A fisherman suggested he had caught it and dragged it 3 miles south. We then instigated a search pattern to be completed during the night. The overnight search for the missing mooring was not successful so we went back to where the fisherman thought it was and fired the release. We then searched unsuccessfully for 1.5 hours and we were on the way back to the mooring site to try firing it again when the mooring was spotted and was recovered by 0830. It must have been in the position where it was originally deployed.

We then steamed north to Fraser Island and started the CTD section towards the southeast. A strong southeasterly meant that in between stations we were steaming at between 4 and 8 knots for several days. During this time we rearranged some of the locations of the CTD stations to try and save time. Eventually on March 28 the wind decreased and for the remainder of the cruise we had good weather.

The first dynamic height mooring was recovered on the morning of March 29. We then continued south completing CTD stations. The second dynamic height mooring was recovered on April 1. We then completed the few remaining stations on the Lord Howe Rise section before starting the final CTD section westward towards Newcastle. On the first station of this section we had problems with the CTD wire spooling. Because of the time lost in the early part of the cruise, this section was done along 36°S to 157°E and thence to Newcastle, with coarser sampling than originally planned. We completed this section on Saturday 7 and then steamed to Newcastle.

Equipment Report

The most serious problem during the cruise was the CTD wire winch. The wire was damaged at 4750 m and there were problems with the spooling gear with the new drum. Late in the cruise, it was noticed that during the first few hundred meteres of a CTD cast the wire was going slack and then snapping taut. There is an urgent need for tension measurements (including maximum and minimum tensions over a few second period).

A detailed electronics and computing report are attached. In summary, all of the electronics and computing equipment appears to have worked well although some minor problems were experienced.

The altimeter was removed (during Fr02/90) as it always read 25 m and replaced with the spare unit which worked fine. There was a total loss of signal on CTD station 15 and the station was repeated after redoing the splice. A couple of kinks were found in the wire and it had to be respliced. There were minor problems with the rosette and it is best to only put 23 (rather than 24) bottles on the rosette. All contact was lost with the CTD at 4500 m on station 131.

A test CTD cast to 3000 m was completed with unit 4. There did not appear to be any significant difference to unit 1.

One Niskin bottle was slightly damaged and two were lost completely. While some of the bottles are fitted securely, there needs to be a more fail safe attachment.

There were some minor problems with the VAX and a more detailed report is given in the attached computing report.

The ADCP worked well.

The most serious problem experienced on cruise FR10-11/89 was the variability of the deep nutrient data. During FR2/90, duplicate and triplicates samples were taken and 2 bottles were fired at a number of depths but no anomalies were found. The possibility that the tubes for the nutrient samples were overfilled was then tested. All tubes that were overfilled produced anomalous values. For FR03/90, only one set of samples (unfiltered and frozen) were taken and analysed. The nutrient data all appear to be of high quality.

Results

A total of 87 CTD stations were completed during FR2/90 and 57 during FR11/89 (Figures 1 & 2). Not all of the CTDs were to the bottom because of the damage to the wire at 4750 m. A total of 154 XBTs were dropped (98 on FR2/90 and 56 on FR3/90). The ADCP operated continuously and appeared to give excellent results.

All of the planned chlorine-36 samples were collected.

Some of the uncalibrated CTD data as well as the nutrient and ADCP data were plotted during the cruise. At 28°S, the CTD/ADCP section indicated a strong southward flow of the East Australian Current (EAC). As on FR10/89, some of this flow appeared to return northward further offshore. An eastward flow was seen on the section north of New Zealand and on the section along the Lord Howe Rise.

On the 43°S section, there was some indication of southward flow, or at least a southward meander, of the East Australian Current. The signature of the different deep basins (the Tasman Sea, the New Caledonia Basin and the Fiji Basin) is clearly evident in the deep Θ/S (and Θ/O_2)data.

As on FR10/89 and FR11/89, the Antarctic Intermediate Water had a considerable variability (and indicated interleaving of different salinity water).

Scientific Personnel

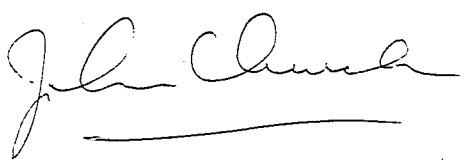
Personnel on board were:

FR02/90

Andrew Forbes	CSIRO, Division of Oceanography	C/Scientist
Dave Vaudrey	CSIRO, Division of Oceanography	
Tony Worby	CSIRO, Division of Oceanography	XBT's
Erik Madsen	CSIRO, Division of Oceanography	Electronics
Ken Suber	CSIRO, Division of Oceanography	Computing
Ron Plaschke	CSIRO, Division of Oceanography	OMS
Gary Critchley	CSIRO, Division of Oceanography	OMS
John Luick	OSI, Unversity of Sydney	
Rosemary Morrow	OSI, Unversity of Sydney	

FR11/89

John Church	CSIRO, Division of Oceanography	C/Scientist
Bob Edwards	CSIRO, Division of Oceanography	
Neil White	CSIRO, Division of Oceanography	Computing
Dave Edwards	CSIRO, Division of Oceanography	Electronics
Fred Boland	CSIRO, Division of Oceanography	Moorings
Kevin Miller	CSIRO, Division of Oceanography	Moorings
Ron Plaschke	CSIRO, Division of Oceanography	OMS
Val Latham	CSIRO, Division of Oceanography	OMS
Caroline Langley	CSIRO, Division of Oceanography	
Xu Peng	OSI, Unversity of Sydney	
Kate Warmus	OSI, Unversity of Sydney	

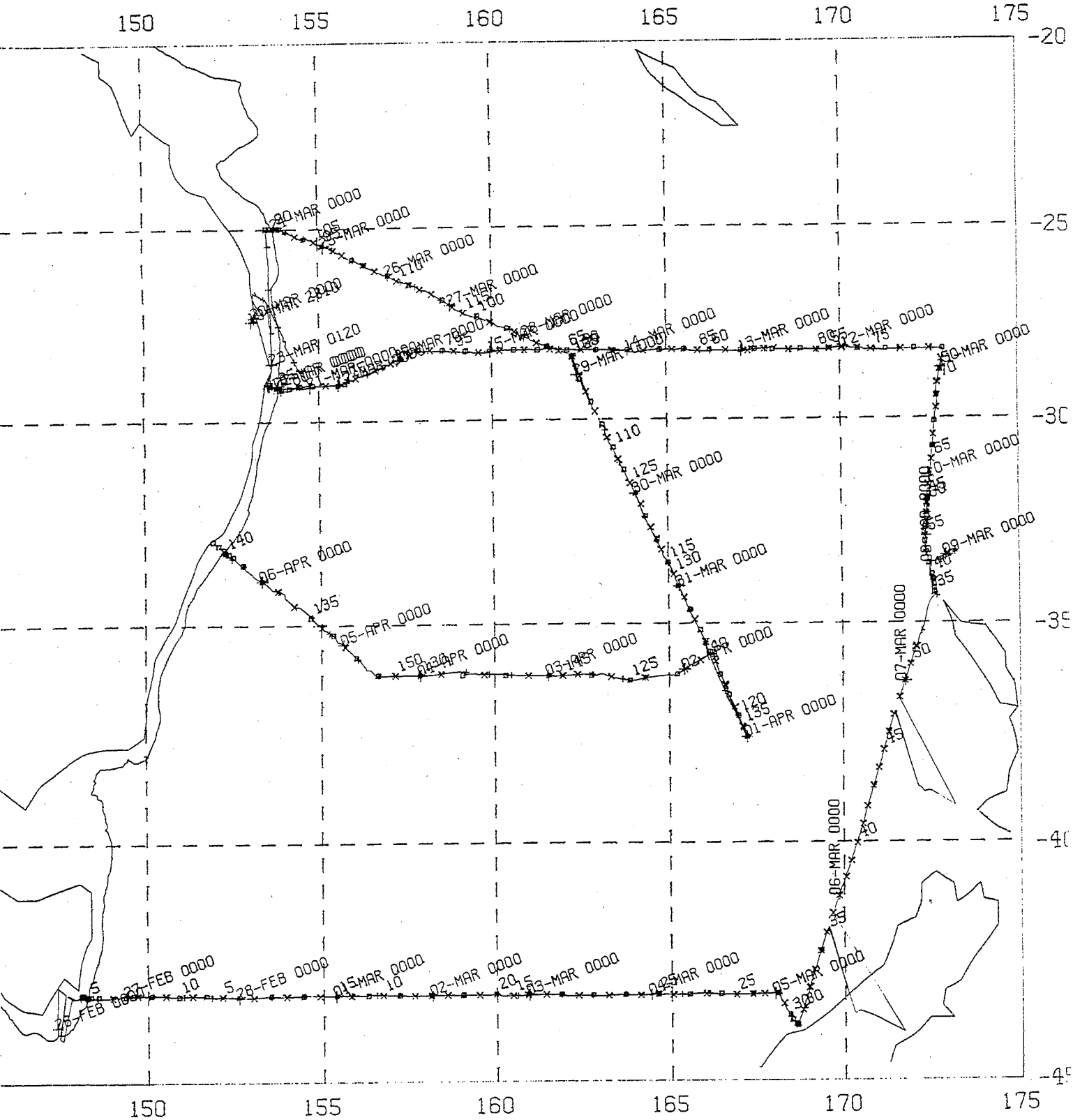


Andrew Forbes

(Chief Scientist, FR02/90)

John Church

(Chief Scientist, FR03/90)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