R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

RV FRANKLIN

RESEARCH PLAN

CRUISE FR 1/89

Sails Hobart 0900 Thursday 5 January 1989
Arrives Adelaide 1300 Monday 16 January 1989

Principal Investigators

John Hunter
Cliff Hearn
Curtin University of Technology

Observations and real time numerical modelling of a part of the South Australian Upwelling Zone

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Anthony White
The Flinders University of South Australia

Geomagnetic Soundings of the Ocean-Continental Transition Zone

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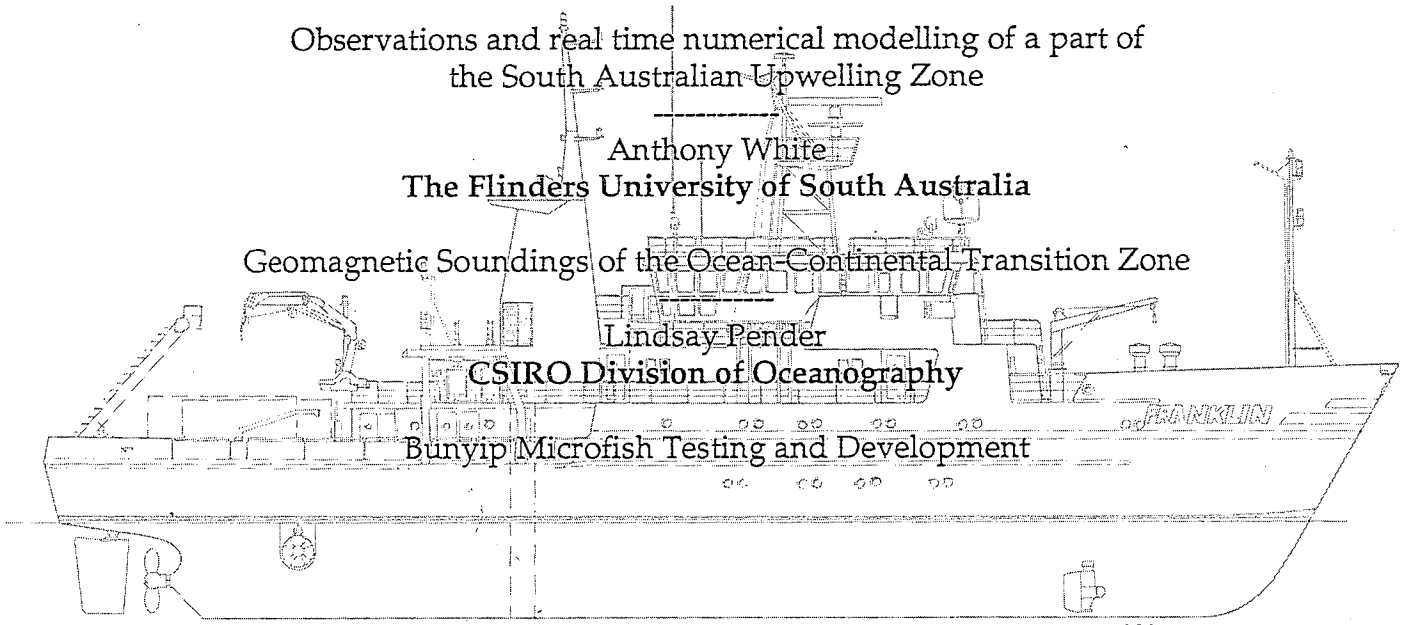
Lindsay Pender
CSIRO Division of Oceanography

Bunyip Microfish Testing and Development



November 1988

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AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

RV FRANKLIN
Research Plan
FR01/89

Itinerary

Sail Hobart Thurs. 5 Jan. 1989
Arrive Adelaide Mon. 16 Jan. 1989

Scientific Programs

To collect a comprehensive observational data set concerning possible wind-driven upwelling events in the South Australian Upwelling Zone, using primarily the "Seasoar" undulator and the acoustic doppler profiler (Hunter/Hearn).

To investigate the use of real-time numerical hydrodynamic models, running on-board ship, as an aid to the direction of an oceanographic cruise (Hunter/Hearn).

To deploy two current meter moorings at the northwest boundary of the upwelling zone, for recovery during a later cruise (FR02/89, Nunes) (Hunter/Hearn).

To deploy four magnetometers along a cross-shelf transect off Robe (White).

Trials of Bunyip Microfish (Pender).

Principal Investigators

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Lindsay Pender,
CSIRO Hobart.

Cruise Program

Since the primary aim of the cruise is an investigation of the intermittent wind-driven upwelling that occurs in summer in the South Australian Upwelling Zone, it is not possible to give a definitive cruise track and itinerary - the program will undoubtedly evolve during the progress of the cruise, depending on the results of both ship and satellite observations. However, the following constraints must be placed on the program :

1 Departure from Hobart on Thurs. 5 Jan. 1989.

2 Arrival at Adelaide on Mon. 16 Jan. 1989.

3 The required deployment of four magnetometers by Dr. A. White on a transect off Robe. It is fortuitous that this transect coincides with the location at which two current meter moorings should be deployed (see (4), below).

The sites of the magnetometer deployments are as follows :

Station code	Longitude	Latitude
AW1	138°30.00'E,	38°42.00'S
AW2	138°50.00'E,	38°18.00'S
AW3	139°10.00'E,	37°54.00'S
AW4	139°30.00'E,	37°30.00'S

4 The deployment of two current meter moorings at a transect off Robe. This transect coincides with the northwest boundary of the real-time numerical upwelling model - observations from these moorings will be used as shelf wave boundary conditions during subsquent hindcast simulations of upwelling events. The logistics of these deployments are currently being organised by George Cresswell. These moorings will subsequently be recovered during the cruise FR02/89 (Nunes).

The sites of the current meter deployments are as follows :

Station code	Longitude	Latitude
CM1	139°18.83'E	37°23.21'S
CM2	139°31.17'E	37°10.13'S

5 The trials of the Bunyip Microfish by CSIRO.

6 Coverage of a series of transects in the shelf region in the vicinity of Port MacDonnell and Portland. The ends of each transect are as follows :

Transect	Length (n.m.)	Station code	Longitude	Latitude
1	37.0	1A	141°27.00'E	38°53.00'S
1		1B	141°55.20'E	38°23.65'S
2	23.7	2A	141°13.36'E	38°44.96'S
2		2B	141°31.37'E	38°26.21'S
3	24.8	3A	140°59.72'E	38°36.90'S
3		3B	141°18.59'E	38°17.21'S
4	20.6	4A	140°46.08'E	38°28.83'S
4		4B	141° 1.79'E	38°12.42'S
5	14.7	5A	140°32.44'E	38°20.75'S
5		5B	140°43.63'E	38° 9.04'S
6	11.4	6A	140°18.80'E	38°12.64'S
6		6B	140°27.52'E	38° 3.51'S
7	13.7	7A	140° 5.17'E	38° 4.53'S
7		7B	140°15.61'E	37°53.56'S
8	19.3	8A	139°51.53'E	37°56.40'S
8		8B	140° 6.20'E	37°40.94'S

These transects are shown on the attached chart.

It is desired that the vessel, towing the "Seasoar" undulator at 6 kts., work into water depths as shallow as **40 metres.**

The provisional cruise track is as follows :

Activity	Estimated distance (n.m.)	Estimated time (hrs.)	Total time (hrs.)
Hobart - 1B (at 11kt.)	600.0	54.5	54.5
Towing "Seasoar" at 6kt.:			
1B - 2B	19.0	3.2	
2B - 5A	46.9	7.8	
5A - 8B	44.9	7.5	73.0
8B - CM2 (at 11kt.)	41.2	3.7	
Deploy current meter mooring at CM2	-	5.0	
CM2 - CM1 (at 11kt.)	16.2	1.5	

Activity	Estimated distance (n.m.)	Estimated time (hrs.)	Total time (hrs.)
Deploy current meter mooring at CM1	-	5.0	88.2
CM1 - AW4 (at 11kt.)	11.2	1.0	
Deploy magnetometer at AW4	-	1.0	
AW4 - AW3 (at 11kt.)	28.8	2.6	
Deploy magnetometer at AW3	-	1.0	
AW3 - AW2 (at 11kt.)	28.7	2.6	
Deploy magnetometer at AW2	-	1.0	
AW2 - AW1 (at 11kt.)	28.7	2.6	
Deploy magnetometer at AW1	-	1.0	101.0
AW1 - 8B (at 11kt.)	97.3	8.8	109.8
Towing "Seasoar" at 6kt.: One complete coverage of grid :			
8B - 5A	44.9	7.5	
5A - 28	46.9	7.8	
2B - 1B	19.0	3.2	
1B - 1A	37.0	6.2	
1A - 2A	13.5	2.2	
2A - 2B	23.7	3.9	
2B - 3B	13.5	2.2	
3B - 3A	24.8	4.1	
3A - 4A	13.5	2.2	
4A - 4B	20.6	3.4	
4B - 5B	13.5	2.2	
5B - 5A	14.7	2.4	
5A - 6A	13.5	2.2	
6A - 6B	11.4	1.9	
6B - 7B	13.5	2.2	
7B - 7A	13.7	2.3	
7A - 8A	13.5	2.2	
8A - 8B	19.3	3.2	171.1
A further complete coverage of grid :		61.3	232.4
8B - Adelaide (at 11kt.)	240.0	21.8	254.2
Contingency and trial of Bunyip Microfish (CSIRO)	-	20.0	274.2 (11.4 days)

Contingency Plan in the Event of Non-availability of the "Seasoar" System

In the event non-availability (eg. failure) of the "Seasoar" system, the above cruise track would be unaltered, but each transect would consist of a series of conventional CTD stations. The station separation would be about 5 nm, which, for an on-station time of 20 mins. and an inter-station speed of 11kt., yields an average coverage speed of about 6kt. (ie. equivalent to the "Seasoar" towing speed).

Grid Coordinates

It would be helpful if position information were related to the grid coordinates used by the real-time model and by the pattern of the cruise track given above. The grid used is as follows :

Spheroid :	Australian National Spheroid (Semi-major axis : 6378160 m, Flattening : 1/298.25)
Projection :	Mercator
Scale	1:1 at latitude 38^{o}S
Origin	141^{o}27'E, 38^{o}53'S
Axis rotation :	53^{0} anticlockwise (ie. x-axis is at 37^{o} True, y-axis is at 307^{o} True)
Hence :	Station 1A is at the origin (0,0), Station 1B is at (68600,0), Station 8A is at (0,175000), Station 8B is at (35700,175000), and the transects are drawn at y-increments of 25000 m

Equipment to be Supplied by National Facility

The primary data requirements for input to the real-time model are :

(a) The thermocline depth over the model area (especially at the open boundaries)

(b) The temperature/salinity/density contrast across the thermocline

(c) The wind speed over the model area

It is intended that these data are input manually to the model, and hence should be readily available from the respective sensors soon after collection.

Since a major aim of the project is to collect a comprehensive data set pertaining to upwelling events in the region, both for the purpose of extending our understanding of such events and for use in subsequent hindcast modelling, it is important that all processed data is logged and made available at the end of the cruise.

There are hence two forms of data required :

I "Quick-look" data available soon after collection for manual input to the real-time model.

II Logged processed data covering the duration of the cruise.

These forms will be referred to as types "I" and "II", respectively.

Specific equipment and data requirements are as follows :

1 "Seasoar" undulator, equipped with Neil Brown CTD.

Type I data should consist of contour plots of salinity, temperature and density over a vertical swath covering the previous vessel track. The plots should be periodically annotated with position information (longitude/latitude or the model grid coordinates (see above)). It would be helpful if, after a number of transects had been made, the surface salinity/temperature/density data could be provided as a horizontal contour plot.

Type II data should consist of processed salinity and temperature, tagged with geographical position, vertical position and time. The frequency of logged processed data should be equivalent to a depth difference of about 1 metre between adjacent points.

It is desired that the "Seasoar" undulator work to within 20 metres of the sea bottom. The rise and fall speed of the undulator should be about 1 m/s, which at a towing speed of 6kt. (3m/s) and a vertical data spacing of 1 metre, yields a horizontal data spacing of about 3 metres.

2 Conventional Neil Brown CTD

There is no plan to use this instrument in this program. However, it should be operational and available in the event of non-availability of the "Seasoar" system. The CTD should be equipped with the rosette sampler for calibration purposes.

Type I data should consist of vertical profile plots of salinity, temperature and density at each station. It would be helpful if, after a number of transects had been made, the surface salinity/temperature/density data could be provided

as a horizontal contour plot.

Type II data should consist of processed salinity and temperature profiles tagged with geographical position and time. The format should deviate slightly from the "Standard Product" in that data should be provided **every metre** in the vertical.

3 Calibration Facility for "Seasoar" CTD

Some means of in-situ calibration of the "Seasoar" CTD should be provided. The simplest method of salinity and temperature calibration is probably through the lowering of a conventional bottle on the hydrographic winch, and the "Seasoar" over the stern, to a convenient point in the surface mixed layer, and simultaneous sampling.

4 Acoustic Doppler Current Profiler

Type I data should consist of vertical profiles of velocity as soon as possible after the data is gathered.

For Type II data, the "Standard Product" data would be sufficient.

5 Meteorological Instruments

The primary variable is wind speed and direction, corrected for vessel motion.

Type I data should consist of a continuous display of vector-averaged wind (averaged over a period of about an hour).

For Type II data, the "Standard Product" data would be sufficient.

6 Thermosalinograph

Type I data should consist of a continuous display of surface temperature and salinity.

For Type II data, the "Standard Product" data would be sufficient.

7 Meteorological Charts from Facimile Recorder

Periodic meteorological charts from the facimile recorder are required.

8 Sea-Surface Temperature Data from NOAA Satellite Imagery

It is understood that these will be relayed from CSIRO, Hobart by Inmarsat. The logistics are currently being organised by George Cresswell.

9 VAX 11/750

The real-time model and some other smaller, less computationally intensive programs will be run on this machine.

It is planned that all graphic output of the model will be via an IBM PC/XT/AT or compatible. It is also planned that all software transfer will be via IBM compatible 5.25" disk. It is hence imperative that an IBM PC/XT/AT or compatible be permanently connected to the VAX 11/750. While a personal computer could be transported from Perth to Hobart and Adelaide to Perth, it is far preferable that a CSIRO computer be provided for this purpose. It is understood that a COMPAQ could be made available by CSIRO. The requirements are :

(a) PC/XT/AT or compatible
(b) CGA, EGA or Hercules graphics capability
(c) One, preferable two, 5.25" floppy disk drives

It is also necessary that the VAX 11/750 has **Kermit** data transfer software.

Two ports to the VAX 11/750 are required (one for continuous use with the real-time model, the other for general computing).

Personnel

John Hunter	Chief Scientist	Curtin University
Cliff Hearn		"
Greg Bush		"
Tim Pauly		"
George Cresswell		CSIRO Oceanography
Anthony White	Project Scientist	Flinders University
Brenton Perkins		"
Jan Peterson	Cruise Manager	CSIRO-ORV
Lindsay Pender		"
Ian Helmond		"
Erik Madsen		"
Dave Terhell		"

This cruise plan is in accordance with the directions of the National Facility Steering Committee for the oceanographic research vessel *Franklin*.

A.D. McEwan
CSIRO
Division of Oceanography

D.H. Green
National Facility Steering Committee

November 1988

SOUTH AUSTRALIAN UPWELLING ZONE (FROM CHARTS AUS 348 AND 349

SCALE ≃ 1: 706,900 (AT 38°)