R.V. FRANKLIN

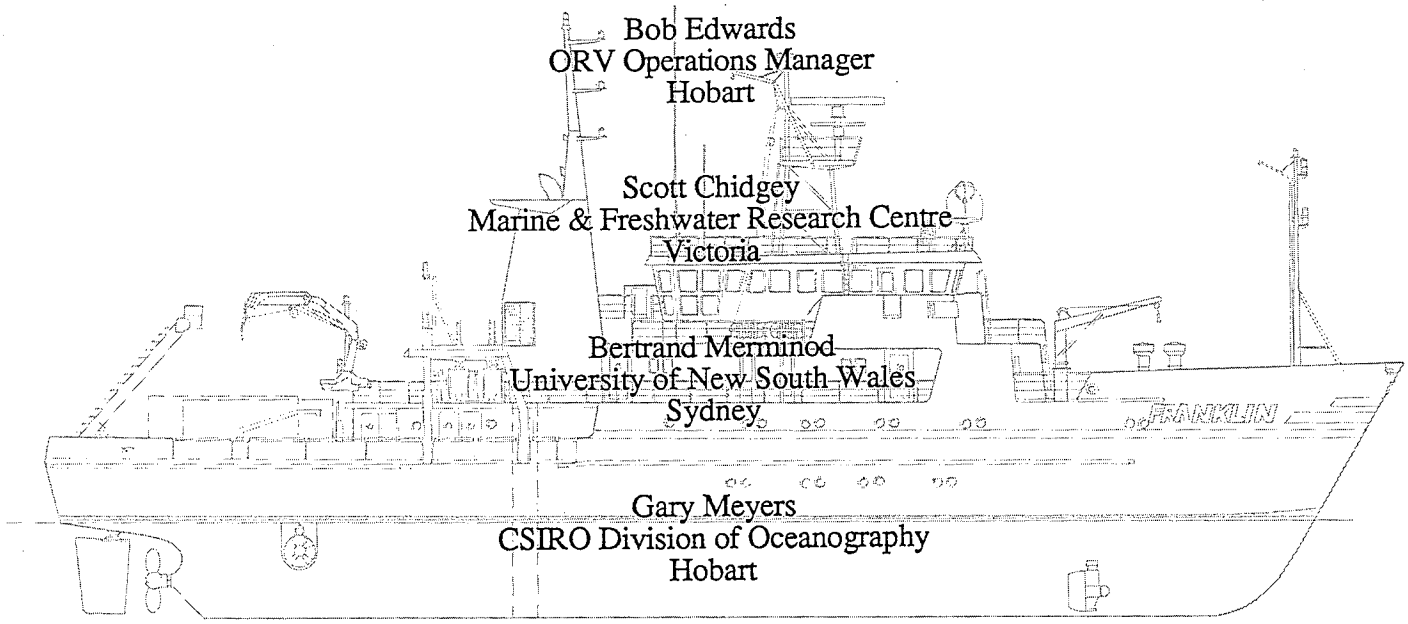
NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

RESEARCH SUMMARY

R.V. 'FRANKLIN'

FR10/88

Principal Investigators:



For further information contact

ORV Operations Manager
c/- CSIRO Division of Oceanography
GPO Box 1538, Hobart, Tas. 7001
Telephone (002) 20 6222
Telex AA 57182

AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

CRUISE SUMMARY

FR 10/88

Itinerary

Departed Hobart 2010hrs Mon 31 October 1988
Arrived Hobart 1430hrs Wed 2 November 1988

Scientific Programs

To test modifications to, and the use of Bunyip in the CTD profiling mode in shallow water.

To undertake bottom photography and bottom sampling in the Jarosite dumping area.

To undertake an experiment to see if it is possible to determine ship's heading to 0.1 deg. using GPS in a differential mode.

To undertake a comparison of the Franklin XBT unit, and a new XBT - satellite transmission unit developed by ARGOS (France).

Principal Investigators

Bob Edwards
ORV Operations Manager
Hobart

Scott Chidgey
Marine & Freshwater Research Centre
86 Kent Street
Richmond Vic 3121

Bertrand Merminod
University of NSW
Sydney

Gary Meyers
CSIRO Division of Oceanography
Hobart

Results

Bunyip trials

Bunyip was successfully deployed with a Neil Brown CTD, showing good dynamic stability and in general responding well to commands. Control algo-

rithms for operating Bunyip in shallow water were tested extensively and proved to be suitable for it's safe operation under such conditions. Finally tests indicated that a minimum turning radius equal to the length of cable out, is a safe operational guide-line. Intermittent faults were apparent in the Sea-Soar hydraulic unit, however these were not sufficient to warrant replacement of the unit at sea. A faulty underwater connector did require replacement. The Mesotech altimeter mounted in Bunyip proved to be unreliable and will be repaired. The above problems, although inconvenient, did satisfy us that Bunyip responded in a safe manner when they occured.

Bottom photography and sampling

Two seabed photographic tows using the Ocean Science Institute of Sydney (OSI) camera sled, were taken in the vicinity of the Jarosite dump site. The prevailing wind and sea conditions, although far from extreme (15 knot winds and 4 meter swell), limited the tows to a direction diagonal to the depth contours. This and the failure of the ships EK400 sounder to detect the camera pinger, made control of the camera sled depth particularly difficult. On the second tow the original pinger was replaced with a Benthos pinger from the ship, but with no success. The success of the photographic runs will only be known once the film is developed. Three bottom grabs were attempted. The first was directly over the dump site, and returned a good sample of bottom sediments. The second and third grabs south of the dump site returned only a small amount of rubble, probably as a result of the bottom being hard.

Differential GPS tests

During the cruise, GPS was up in the time window between 1700 and 2200 hrs (local time). Differential GPS measurements were to be made between two antennae on the ship (one on the fore mast and the other on the funnel), and one fixed antenna located at the University of Tasmania.

On the 31 Oct 88, ship based data was only collected from the funnel antenna; the fore antenna being inoperative due to a faulty connector. This data gave 5 hrs of differential information between the funnel antenna and the land based antenna. On the 1 Nov 88, 1 hr of synchronous data was collected from all antennae. Tape drive problems on the receivers prevented a more complete data set being obtained. The results of these measurements will take approximately a month to analyze.

XBT tests

Ten simultaneous casts using the ARGOS and Franklin units were made in the proximity of the Jarosite dump site between and 0300 and 2237 hrs on 1 Nov 88. The 9'th Franklin XBT was a dud.

Cruise Narrative

RV Franklin sailed from Hobart at 2010 hrs (local time) on 31 Oct 88, head-

ing to a position 4 n mile NE of the Jarosite dump site (43 36°S, 148 12°E), which was reached at 0120 hrs on 1 Nov. During this sailing period, differential GPS data was recorded from the funnel antenna. No signal was received from the fore antenna and it was unsafe to fix the fault while we were sailing.

From 0120 to 0225 hrs we collected 80 lt of water from a depth of 10 to 50 m, for the Fisheries division algal culture group. This water was collected using 30 lt Niskin bottles attached directly to the hydrographic winch wire. The collection was aborted prematurely due to the difficulty in handling the bottles in a 4 m swell, and a slipping hydrographic winch.

The first camera tow commenced at 0430 hrs on a heading of 240°, sailing in the direction of the wind of 15 knots. Maintaining a speed of between 1 and 2 knots, we were unable to detect the camera's pinger and had to control the camera sled altitude by comparing the ships depth sounder and the cable out. At 0530 hrs the camera was retrieved so that the pinger could be replaced by a Benthos unit. After sailing to a position of (43 37°S, 148 11°E), the camera sled was redeployed at 0900 hrs. Again the pinger could not be detected, and the camera was finally retrieved at 1300 hrs. During the period of time from 0300 to 1300 hrs, 9 simultaneous XBT drops were made.

From 1300 to 1412 hrs we sailed into Port Arthur and anchored so that the stern A frame could be reconfigured for Bunyip (after the camera tow), and the faulty connector on the fore GPS antenna could be fixed. At 1800 hrs RV Franklin sailed from Port Arthur and reached a position of (43 26°S, 148 14°E) at 2000 hrs when Bunyip was deployed in a slight swell. After checking the stability of Bunyip with the CTD unit attached, 400 m of cable was deployed to test Bunyip's depth range at speeds of 6 and 8 knots, and to check for stability in steep climbs and dives. At 2150 hrs communication with Bunyip was lost due to a faulty underwater connector and retrieval was commenced. At 2237 hrs a final simultaneous XBT drop was done.

While within the GPS time window, full differential GPS data was available, however a faulty tape drive restricted the time of data collection to 1 hr.

From 2300 to 0000 hrs on 2 Nov 88 water collection was completed under calmer conditions than the first attempt, at a position 3 n mile east of the dump site. We then sailed directly to the dump site for a bottom grab in 1800 m of water. This was successfully completed at 0200 hrs. The second and third grabs were attempted between 0330 and 0600 hrs, at a position 10 n mile south of the dump site in 2100 m of water. In both attempts the grab was triggered, but no sediment was returned. A small amount of rubble was returned in the second grab.

After replacing the underwater connector, Bunyip was redeployed at 0700 hrs with 150 m of cable in slight seas. Upon reaching the 250 m contour, we sailed north at 6 knots following the contour while completing initial tests of the Bunyip shallow water flight control algorithm. Satisfied with the behavior of the algorithm, at 0745 hrs we headed for Hobart and continued the tests at 8 knots in

150 to 120 m of water. At 0930 hrs a grid profile was started while Bunyip was following a triangular flight path between 50 and 90 m, with climb and dive rates of 1 m/s. The grid consisted of 4 parallel legs of 2 n mile length separated by 1 km, using 500 m radius turns. Finally the behavior of Bunyip during a 150 m radius turn (with 150 m of cable deployed) was noted and retrieval commenced at 1050 hrs. RV Franklin arrived back in Hobart at 1430 hrs on 2 Nov 88.

Summary

The Bunyip tests were successfully carried out despite minor equipment failures. The suitability and operation of the shallow water flight control algorithm was adequately proven.

The bottom photography and bottom sampling were of limited success. A project requiring bottom photography using the OSI camera sled needs much more time to be successful, and a better scheme for detecting the sled pinger needs to be employed. Future users should consider using a detector other than the ships EK400 with its restricted detection angle, which requires the sled to be nearly under the ship for success.

Sufficient data was obtained to analyze the usefulness of differential GPS for determining ships heading, and therefore this project was successful. However a better means of archiving data needs to be found, and Bertrand Merminod suggests that future tests should be carried out with the funnel antenna replaced by one mounted from a mast on the stern of RV Franklin. This increases the differential baseline by 50%.

A comparison of the Franklin and ARGOS XBT units was successfully achieved.

Personal

Lindsay Pender	Chief Scientist	ORV Staff
Phil Adams		"
Bob Driscoll		"
Dave Edwards		"
Ian Helmond		"
Dave Terhell		"
Stuart Swan		"
Thor Carter	Photographer	CSIRO Fisheries
Scott Chidgey	Project Leader	M&FRC
Peter Schneider		OSI - Uni of Sydney
Bertrand Merminod	Project Leader	NSW - Surveying
Gary Meyers		CSIRO - DO