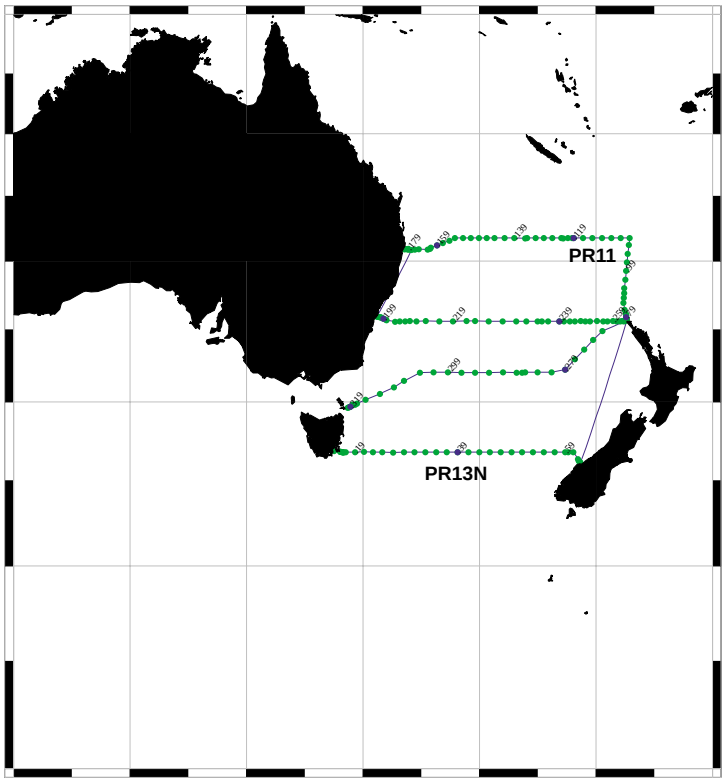
# A. Cruise Narrative: PR11 and PR13N

## A.1 Highlights



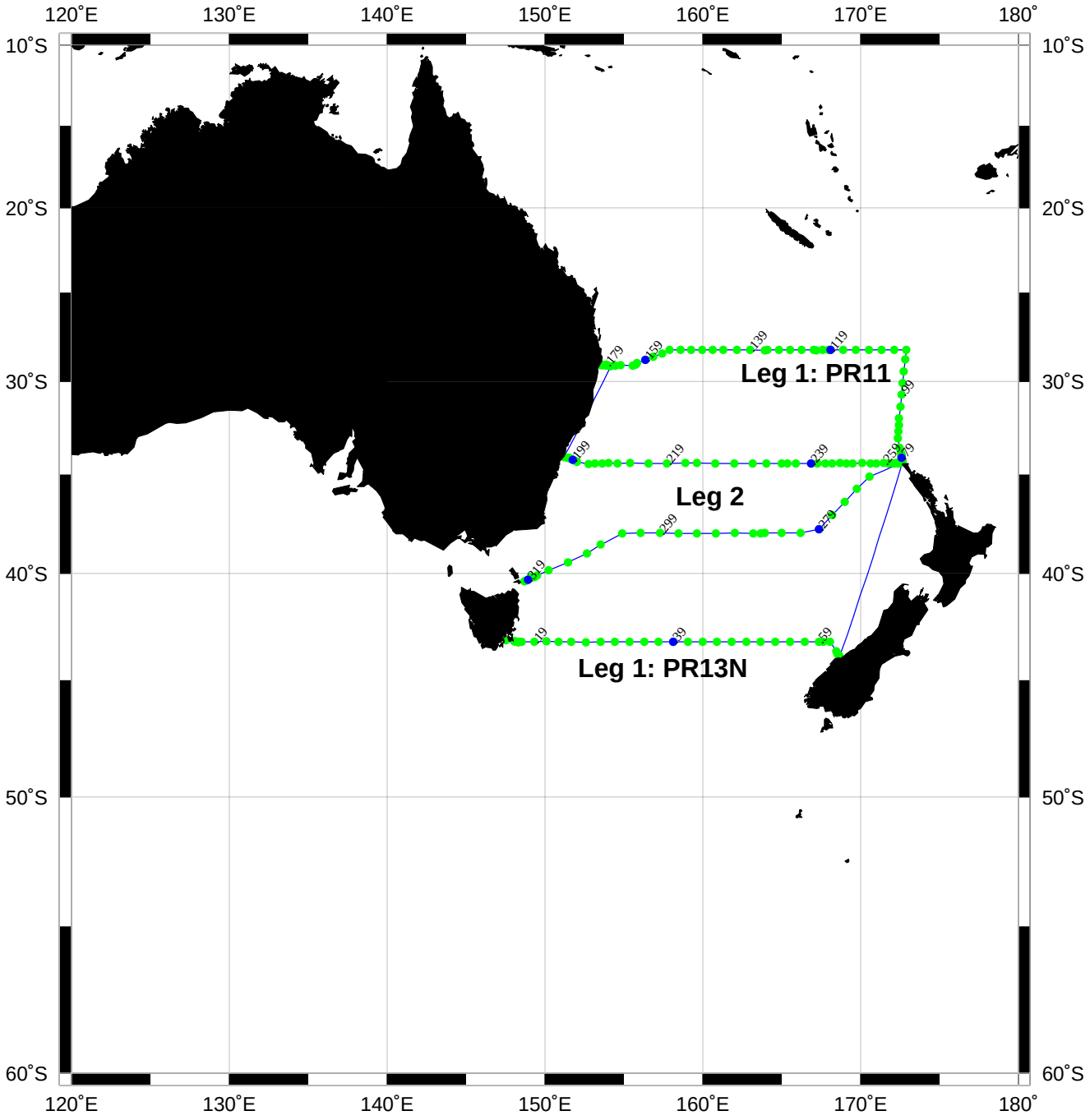

**WHP Cruise Summary Information**

| | | | |
|---|---|---|---|
| WOCE section designation | **PR11** and **PR13N** | | |
| Expedition designations (EXPOCODES) | **09FA1089_1** and **09FA1089_2** | | |
| Chief Scientists | **Andrew Forbes** and **John Church**<br>CSIRO Division of Oceanography<br>GPO Box l538<br>Hobart, Tasmania 7001<br>Australia | | |
| Dates and Ports of Call | Leg 1: | Dep. Hobart: | 1989.AUG.15 |
| | | Arr. Brisbane: | 1989.SEP.06 |
| | Leg 2: | Dep. Brisbane: | 1989 SEP.07 |
| | | Arr. Newcastle: | 1989.SEP.27 |
| Ship name: | R/V Franklin | | |
| Number of stations | 163 | | |
| Station Geographic boundaries | 28° 14.59' S<br>147° 0' E 172° 5' E<br>43° 54.57' S | | |
| Floats and drifters deployed | 0 | | |
| Moorings deployed or recovered | 3 | | |

**WHP Cruise and Data Information**

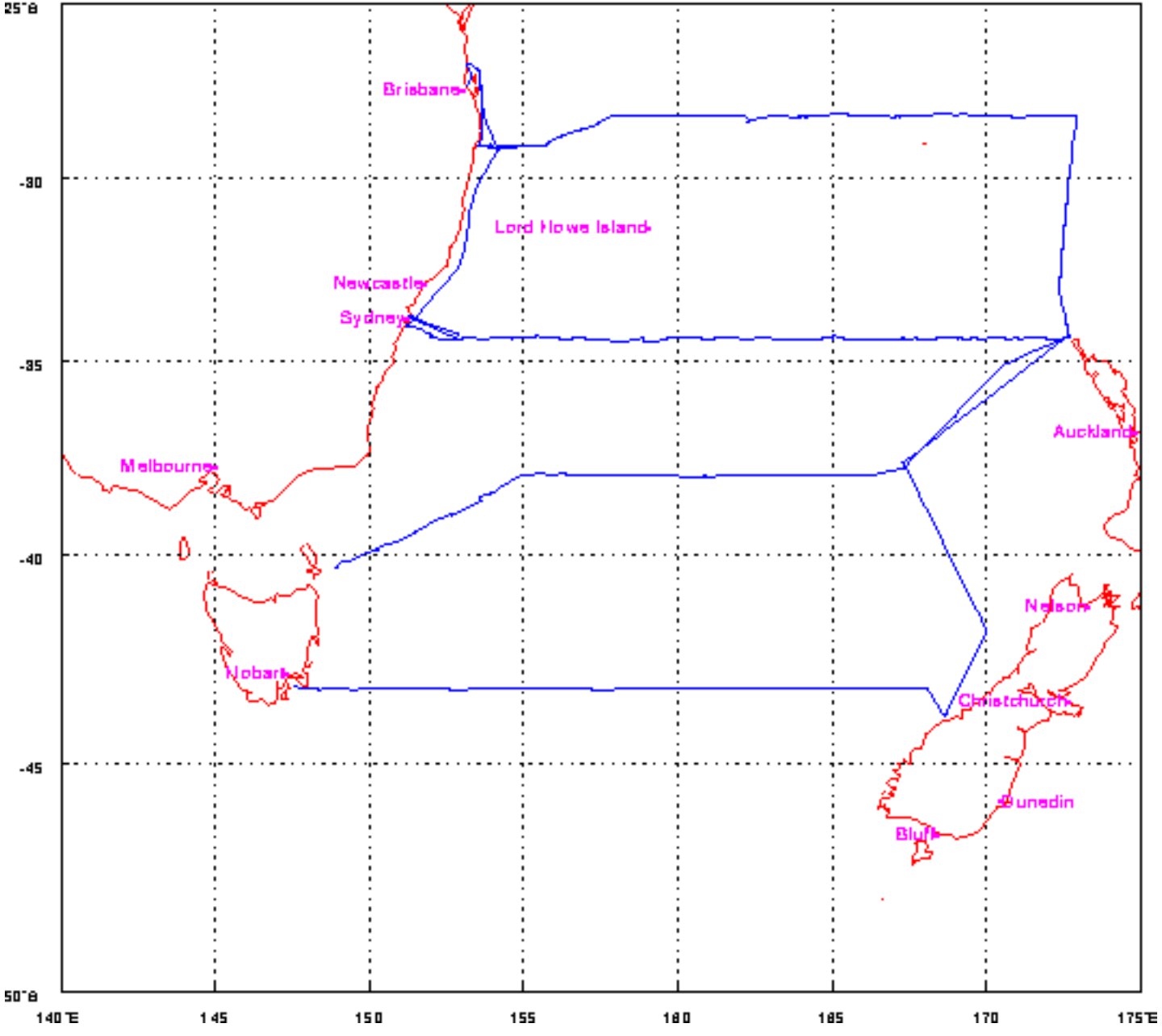
Instructions: Click on headings below to locate primary reference or use navigation tools above. (Shaded headings were not available when this report was assembled or not relevant to this cruise.)

# Station locations for PR11/PR13N • 1989 • Forbes/Church




Produced from .sum file by WHPO-SIO

Franklin Cruise 10/89




Produced by CSIRO

## Scientific Objectives

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).

## Principal Investigators

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## Cruise Narrative

The completed cruise tracks for FR10-11/89 are shown in the attached figure.

The ship left Hobart two hours late after the last of the mooring equipment was loaded with the recently repaired Hiab crane. We did a shallow CTD station in Storm Bay for Brian Griffiths then proceeded to the first CTD station on the western end of the 43°S section. CTD stations progressed normally except for a degree of spiky signal loss on one cast which required the wire to be re-spliced. The weather was very kind to us - sunny skies.

We made good progress on the CTD section, which we finished by midnight, August 22. After that it was the start of a long steam northwest to the first mooring site.

On August 24 we deployed a dynamic height mooring. The expected depth of 1200 metres was not found so we spent an extra hour in the region until we found a maximum of 1020 m of water. XBTs were dropped every two hours as we steamed north towards Cape Reinga. From there we headed north along 172.5°E at the start of another CTD section. The weather continued to be kind to us and we started the 28°S section, heading west, on August 27.

August 30 brought a strong westerly which made CTD marginal for a time, but we managed to continue working. Rain squalls were accompanied by 50kt gusts. The speed between stations slowed down considerably, to about 5 knots at times. We continued CTDs until the evening of August 31, then deployed the second dynamic height mooring. We had trouble finding less than 1500 m water depth, and finally shackled every spare piece of wire together to stretch the mooring to suit the deeper water. The design was for 1200 m. By September 2 the weather returned to excellent conditions and we are made good progress with the CTDs finishing all the deep stations to Stradbroke Seamount before heading inshore to start the moorings on September 4.

Mooring operations went smoothly except for one at 500 m. A longliner had set his drifting lines at our planned site, so we were obliged to wait a couple of hours until the area was clear. On Tuesday, September 5, we steamed for Brisbane, arriving at 0830 the next day.

The first two days of FR11/89 were taken completing the last 8 CTD stations from FR10/89 and deploying the one remaining mooring (all at about 29°S offshore from Evans Head). We then steamed south to the start of the 34°S section. Before station 205, we diverted to Sydney to put ashore a sick crewman.

By the time we had completed station 205, quite a bit of time had been lost (completing the final stations from the previous cruise, diverting to Sydney and because of bad weather). To make up for lost time, we re-planned the remainder of the cruise. We managed to save time by cutting comers at the eastern and western ends of the 38°S section but still required to extend the cruise by one day. These changes will not have a major impact on the analysis of the cruise data.

For most of the remainder of the cruise we had good weather and this allowed us to complete the 34°S section and the revised 38°S section. During the latter stages of the 38°S section we completed a test CTD station for the back-up underwater unit (No. 4). The last station was completed off Cape Barren at about 1100 on Tuesday, September 26.

We then steamed to Launceston.

**Equipment Report**

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

At the end of FR10/89, the PDR trace became very noisy. This problem continued on FR11/89 although the trace became cleaner at the end of the cruise. It is suspected to be caused by some additional turbulence around the transducer.

The thermosalinograph thermistor was damaged during replacement of the thermosalinograph pump prior to the start of FR11/89 and as a result only sea surface salinity (and not temperature) were recorded.

As advised prior to the cruise, GPS data became inaccurate on September 21. The GPS gave anomalous positions and velocities. This appeared to create problems with the ADCP which crashed twice. To overcome the problem, GPS was disabled.

No problems were experienced with the CTD or XBT systems. There was some doubt about at least one of the CTD station salinities. This may be a biological fouling problem and should be resolved during calibration of the CTD data.

Minor problems were experienced with the new 24 bottle rosette. On a couple of stations the bottom bottle was fired but the dial did not move - the bottle appears to have been triggered. On a couple of other stations the bottom two bottles appeared to have been closed simultaneously at the bottom of the cast. There are some corrosion problems with the new rosette and frame.

The rosette frame needs some type of restraining cradle on the floor of the wet lab as in moderate weather problems were experienced with the rosette sliding.

On a number of stations it was not possible to get to the bottom because of problems with the spooling. This needs attention to allow stations to the bottom.

The ADCP worked very well. An alignment test indicated the misalignment was about -0.5' and that the scale factor was about 1.005.

The most serious problem experienced during the cruise was the variability of the deep nutrient data. On FR10/89 it was noted that for some casts the nutrient data gave a smooth profile whilst on other curves they showed a noisy profile. Subsequently (the last half of FR10/89 and all of FR11/89) all nutrient samples were filtered. This did not completely remove the problem. Another possible cause is that some of the bottles were leaking intermittently. However, bottle tests showed only a couple of leaking bottles. A third possibility is that the tubes for the nutrient samples were overfilled. Final resolution of this problem will require further analysis in Hobart.

## Results

A total of 85 CTD stations were completed during FR10/89 and 78 during FR11/89 -almost all to within 50 m of the bottom. A total of 169 XBTs were dropped (108 on FR 10/89 and 61 on FR11/89). The ADCP operated continuously and appeared to give excellent results.

Some of the uncalibrated CTD data as well as the nutrient and ADCP data was plotted during the cruise. At 28°S, the CTD/ADCP section indicated a strong southward flow of the East Australian Current (EAC). Some of this flow appeared to return northward further offshore. An eddy or meander of the EAC was present on the 34°S section. The eddy was still clearly visible at a depth of 2500 m.

On the 43°S section there was some indication of a deep western boundary 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 Q/S (and Q/02) data. The deep salinities on the 43°S section were similar to those in the SCORPIO data. The anomalously high salinity that was present (at depths of 3000 m) at the western end of the 28°S SCORPIO section was not present.

The Antarctic Intermediate Water had a greater variability (and indicated interleaving of different salinity water) than is present in the SCORPIO data. At 28°S, the Antarctic Intermediate Water was fresher than found in the SCORPIO expedition.

The data set collected is probably the most complete data set collected on the circulation of the Tasman Sea. Most of the data appears to be of high quality (with some doubt about some of the deep nutrient data). The data should allow significant progress towards meeting the scientific objectives of the program.

**CTD Measurements**

The CTD used throughout this RV Franklin cruise Fr10/89 was CSIRO CTD No. 2 (A Neil Brown Instrument Systems MkIII B profiler, Serial Number: 01-3006-1013.) The Sensors on the profiler where :

| Sensor | Manufacturer | Resolution | Accuracy |
|---|---|---|---|
| Temperature: | Rosemount PRT | 0.0005°C | ±0.005°C |
| Conductivity: | EG&G NBIS | 0.001mmho | ±0.005mmho |
| Pressure | Paine Instruments | 0.1 dbar | ±6.5 dbar |
| Dissolved Oxygen | Beckman Polarographic | | |

The fast response thermistor had been removed prior to this cruise, in fact the thermistor had not been used on this instrument in the field.

***CTD Temperatures are calibrated*** against the triple points of water (0.010°C) and phenoxybenzene (~27°C) using platinum resistance thermometers as transfer standards. The lab which carries out this calibration (The CSIRO Division of Oceanography Calibration Facility) is accredited by NATA, Australia's National Association of Testing Authorities, to calibrate CTDs to ±0.003°C at the water triple point and ±0.004°C at the phenoxybenzene point. Both of these uncertainties are at the 99% level. Calibration is carried out as often as practicable given the Franklin's itinerary.

Pre cruise Temperature Calibration showed the following results:

| Date | Correction | CTD Reading | Temperature (T-68) |
|---|---|---|---|
| 22/6/89 | 0.002°C | 0.010°C | 0.012°C |
| 22/6/89 | 0.002 | 0.010 | 0.012 |
| 28/6/89 | -0.001 | 26.870 | 26.869 |
| 28/6/89 | -0.001 | 26.870 | 26.869 |

The 99% uncertainty in the correction is ± 0.005°C.

Post Cruise Temp Calibration showed the following results:

| Date | Correction | Temperature (T-68) | 99% confidence interval |
|---|---|---|---|
| 20/02/90 | 0.002°C | 0.009°C | 0.0036°C |
| 16/02/90 | 0.000 | 26.868 | 0.0042 |

These results indicate only a 0.001°C shift in temperature at 26.868°C and no shift at 0°C.

***The CTD pressure was calibrated*** against a deadweight tester in the "down cast" direction only. This laboratory calibration and the "on-deck" pressure prior to deployment was used to determine an offset which could be applied to all stations as a whole. For this cruise an offset of +15.0 dbars was applied.

***Salinity calibrations*** are based on in situ bottle data. Laboratory checks are only maintained to ensure the sensor is operating correctly. Using 2277 sample bottles out of a total of 2563, the difference between the CTD salinities and the water samples showed a standard deviation of 0.0029, for the whole water column.

***Dissolved oxygen calibration*** is carried out using a method very similar to that described in Owens and Millard Jr. (1985). This method is to fit the downcast profile of dissolved oxygen to the sample bottles collected during the upcast. The difference between the CTD downcast oxygens and the sample bottle oxygens show a standard deviation of 3.5189 mmol/L (equivalent to 0.078 ml/l) for the whole water column.

**CTD Data Collection and Processing.**

A PDP 11/73 computer with a 150Mb hard disk was used as the primary data logging device. Data is logged directly to hard disk, whilst simultaneously recorded on audio tape. Logging is commenced before the CTD profiler is deployed and downcast is normally logged as a single file. Positions and times are logged automatically. Upcasts are not recorded wholly, only 10-15 second bursts of data are recorded in conjunction with each Rosette sample firing for use in processing for comparison with Salinity and Temperature calibration. Following completion of pre-processing of uncalibrated averaged files which are networked to a VAX 11/750 for use on-board during the cruise and the raw data and pre-processed files are written to 9 track tape. The data is later transferred from tape to Exabyte cartridge using the VAX/VMS Backup utility. These cartridges contain all the raw data collected during a cruise and are permanently archived.

**Post-cruise processing follows the following scheme:**

- there is an initial 'clean up' stage were station data is checked, unwanted casts are removed, etc.
- a set of uncalibrated 2dB average files are produced, as well as summaries of the data for each sample burst. At this stage temperature and pressure calibrations are put in.
- bad data (e.g. where something has got stuck in the conductivity cell) is removed.
- the sample data is merged with the hydrology data, and some samples are flagged as being 'unsuitable for calibration' (e.g. due to large gradients). An iterative process then follows, where outliers are progressively removed and a calibration constant (a conductivity ratio) is determined for each station.
- once this has been done, calibrated 2dB average files are produced. A simple recursive filter is used to 'slow down' the faster sensors (pressure and conductivity) to the slowest sensor (temperature - the response time of the platinum resistance thermometer is ~.175 seconds). Values are checked for implausible gradients, and any ascending parts of the trace are ignored (i.e. any values for which the pressure is less than the maximum pressure for this cast so far are ignored). At the same time 2dB averages of oxygen current and oxygen temperature are calculated.
- the calibrated 2db averages are plotted, and the plots examined. In addition, T/S curves of groups are plotted and checked for agreement of the deep T/S values. The traces are also examined for density inversions, and sections removed if this seems appropriate.

**Salinity Measurements**

The water samples salinities where measured with a YeoKal Model 601MkIII Inductive Salinometer that was standardized daily with IAPSO Standard Sea Water (SSW) Batch P106 (Date: 8 June 1987, Cond Ratio: 0.99989).

The accuracy of the salinometer claimed by the manufacturer is 0.003 psu. (Yeo-Kal Electronics Pty Ltd, Brookvale, NSW, 2100, Australia)

## Oxygen measurements

The method used is a modified Winkler titration. All oxygen values (bottle and CTD) were converted from mmol/l to mmol/kg using the salinity and in-situ temperature at the time the Niskin bottle was closed. This is justified as our Oxygen samples are always drawn first, and will have, at most, increased in temperature by a few degrees by the time they are sampled and fixed.

## Nutrient Analyses

Samples are collected in 15ml polypropylene tubes and frozen for up to one week before analysis using a Technicon AA2 system. They are allowed to thaw at room temperature.

Nitrate determination is based on the reduction of nitrate in the sample to nitrite using a granulated cadmium reductor column and imidazole buffer. Nitrite then reacts with sulphanilimide to form a diazonium ion which reacts with napthylethylene dihydrochloride to form a coloured azo dye which is measured at 550nm. Only 'nitrate plus nitrite' is reported for this cruise.

Dissolved phosphate is determined by reaction with acid molybdate in the presence of antimony ion. Phosphomolybdate is then reduced by ascorbic acid at 37°C and the blue complex measured at 880nm.

Reactive silicate is combined with acid molybdate and the complex reduced by methylaminophenol. Interference by phosphate is eliminated by the addition of oxalic acid which reacts with excess molybdate and the blue colour is measured at 820nm.

Nutrients were converted from mmol/l to mmol/kg using the nominal temperature of the chemistry lab on RV Franklin (25°C)

## Cruise Participants

| | Name | Responsibility | Affiliation |
|---|---|---|---|
| **Leg 1** | Andrew Forbes | Chief Scientist | CSIRO DO |
| | Neil White | CTD Software | CSIRO DO |
| | Helen Phillips | Watch Stander | CSIRO DO |
| | Bernadette Baker | Watch Stander | CSIRO DO |
| | Fred Boland | Moorings/CTD Watch | CSIRO DO |
| | Kevin Miller | Moorings/CTD Watch | CSIRO DO |
| | Danny McLaughlan | Moorings/CTD Watch | CSIRO DO |
| | Ron Plaschke | Nutrients/Salts/DOs | CSIRO DO |
| | Mark Rayner | Nutrients/Salts/DOs | CSIRO DO |
| | Phillip Adams | Electronics | CSIRO DO |
| **Leg 2** | John Church | Chief Scientist | CSIRO DO |
| | Gary Meyers | XBTs | CSIRO DO |
| | Dave Vaudrey | CTD/Hydrology | CSIRO DO |
| | Erik Madsen | Electronics | CSIRO DO |
| | Bob Beattie | Software Support | CSIRO DO |
| | Bruce Barker | Nutrients/Salts/DOs | CSIRO DO |
| | Gary Critchley | Nutrients/Salts/DOs | CSIRO DO |
| | Rosemary Morrow | Watch Stander | OSI, Uni Sydney |
| | John Luick | Watch Stander | OSI, Uni Sydney |
| | Song Haiguang | Watch Stander | OSI, Uni Sydney |

## References

Owens, W. Brechner and Robert C. Millard Jr. " A new Algorithm for CTD Oxygen Calibration." Journal Of Physical Oceanography, 15, 621-631. 1985

**Equipment Status**
(P. Adams - technician)
1989.AUG.05

**ADCP**
The ships heading read 359.9 continuously, the leds remained unaltered. The fault was traced to an incorrectly placed connector.

**CTD**
The dissolved oxygen sensor failed to operate from the start of the cruise. A new sensor was fitted along with a new receptacle, there are no more serviceable 02 sensors on board, the old receptacle needs repairing. The CTD wire was re-terminated 3 times during the cruise the loss of cable being approx. 10 meters.

**Rosette Sampler**
The rosette u/w unit was removed from its frame after corrosion appeared on the upper and lower plates. On reassembly the rosette was isolated from the frame in as many places as possible, and extra sacrifical anodes were attached.

**Thermosalinograph**
The TGS pump burnt out and the salt water pump from the wet lab was used in its place. The modified plumbing did not pass through the temp sensor, sea surface temp was available only through the conductivity cell temp probe.

**SIMRAD EK400**
The EK400 developed a noise problem towards the end of the cruise. The system worked ok at low speeds however at speeds above 3 knots the transducer large amounts of noise. The problem had not been resolved at the end of the cruise.

**XBT**
The XBT system worked well using the hand launcher with the extension on it. The other hand launcher was not used on this cruise, but had previously given erratic temperatures near the surface.

**General**
A second cable was installed between the library and the decserver, it provides a fourth general purpose input into the network. (to be used with the mac) The cable information sheet book was checked, updated and placed onto a 123 spreadsheet, then formatted using Word.

**Electronics Report for FR11/89**

**CTD #2 and Rosette Sampler**

Excessive corrosion of the 24 bottle rosette sampler was evident from the previous cruise, 6 additional sacrificial anodes were attached to the s/steel frame, level with the rosette top plate in order to stem the corrosion. As the firing pins are very close on this rosette it was found advantageous to leave bottle 24 off to avoid miss firing of bottles 1 and 2. The top ring of the support frame is distorting the rosette plate and causing one of the bottles some times not to close, although the stepper motor did turn. Some modifications are required to this frame to make easier access to the rosette sampler top plate assembly, to isolate it from the s/steel frame and to make room for a large, sacrificial anode. Modifications to the holding mechanism in the wet lab are also required as the larger frame tends to slide in rough weather. A broken Y-cable caused loss of communication during a deep station, thus necessitating repeating the station. As the ctd wire is now 2.5 - 3 yrs old, the master requested that a piece of it be tested to breaking point by Bullivants, on a regular basis.

**CTD #4**

This ctd was tested to 2000 m. at posn app. 40°S, 150°E and appeared to be performing satisfactorily. D. Vaudrey has data tape which will be calibrated for salinity and temperature from Niskin bottles and thermometers.

**Thermosalinograph**

The TSG pump motor failed during the previous cruise and was replaced in Brisbane, however during the replacement the main temperature thermistor was broken and requires replacement. In the mean time the main temperature is logged as -2.05°C.

**EK400 Sounder**

The previous cruise report stated problems with the 12Khz sounder, I did a number of tests on it and came to the conclusion that either the transducer was loose in its mounting or some external device was causing turbulence, proportional to ships speed over the transducer surface. Later talks with ships officers revealed that problems were had with the bow thruster during the previous cruise and the flush cover was possible warped. This ties in well with my diagnosis of the sounder symptoms.

**ADCP**

This performed faultless for the duration of the-cruise, and only on two occasions did I have to re-boot micro7 to overcome some soft ware problems.

**GPS Navigator**

Although we were advised from AWA prior to the cruise that the GPS constellation would be down for the period 20 Sep. - 4 Oct. we were still able to use the GPS for all of 20 Sep. and about half the coverage window for 21 Sep., at this time I disabled all satellites as there was some evidence of false positions, however they were all re-enabled on 23 Sep. and appeared to operating normally. All satellites were supposed to be set unhealthy from 20 Sep., but this did not eventuate at all.

**Computer Equipment**

This is the first cruise in recent times where there were no serious problems associated with the computing equipment

**For ORV Electronics**

**Computing Report**

FR11/89 was one of the quietest cruises, computer-wise, that I have been involved with. Almost without exception, the equipment worked well and there were no unexpected problems with the logging software. I feel that the software and documentation are now such that we are approaching the point where the computer systems can be operated by relatively inexperienced personnel.

There were few blackouts during the cruise and those that did occur had no effect on the logging equipment as the UPS is now working.

**Work Done**

- DELP routine DISPLA was modified so that the display blinks for programs and CPU's that are 'down'.
- I restored additional VAX system disk files that were lost in the crash during FR7/89. They included 'C' and LSE. (except that LSE is missing [SYSEXE]LSEDIT.EXE and [SYSMGR]LSE$STARTUP.COM.)
- The batch procedure for processing the VAXed ADCP data was rewritten so that it would be automatically scheduled to run each day.
- I wrote a program to merge the Sat Nav and GPS fixes and access routines to enable John Church to access this data

David Crooks' Hydrology and MTSPOL manuals were converted to Microsoft Word. A number of other manuals, including the Cookbook and the VAX Utilities Manual, were updated. (We desperately need the hard disk on the ship's Mac. There was insufficient space on a diskette to 'save' the Cookbook after an editing session, even when using a very stripped down system.)

## Outstanding Problems

- The ADCP manual needs more documentation of the meaning of the various error messages and of how to recover from the error. As many of the error conditions as possible should be fixed automatically, rather than relying on the operator intervention. e.g. the display task DSP should be restarted by the system if it finds that it has exited.
- The console log files for MICRO6 are not being taped. This is because the console files require privileged access but the console device (CO:) has to be unprivileged to prevent problems with the CTD archiving program.
- The CTD software can have problems with the real-time display when logging is changed from one underwater unit to another and then back to the first. If the same master file is used on both occasions for the first underwater unit, the option program has no way of getting the correct unit number and framing parameters. A copy of an option file from the first session must be saved and then be renamed as the highest version when the first CTD unit is re-installed.
- DLPEVN crashed a number of times. I tried to make an overlaid version that did not have to use the Fortran Cluster Library, but did not succeed because of subtle problems with the overlay structure.
- The Zeta plotter has been experiencing origin shifts, and it will have to be returned to the agent for servicing. It also requires a new pen carriage.
- The VAX rebooted unexpectedly on 2 occasions. No error messages were printed and the cause remains a mystery.

## Data Processing Notes

| Date | Contact | Data Type | Data Status Summary |
|---|---|---|---|
| 08/15/97 | Corry | SUM/BTL | Data submitted to WHOI, reformatted |
| | FILE HISTORY/SOURCE: Hydro data received on MAC 3.5, in WriteNow format. Chuck converted to semi-dos, still lots of ANSI chars. Mac troubles w/ fr290, on VMS del 3 lines of non-printables, then okay. Reformatted .sum file, lining up cols. for char string read. Pgm REFRANK, converts quasi-whp to current whp version (not Corrys); temps reconverted back to IPTS-68, N+N Q1 flag changed from 'A' to 2, 'B' to 3, bottle Q1 set to '2'. Pgm ADDTHETA used to overwrite -9 theta col. | | |
| 12/11/00 | Uribe | DOC | Located in "sum" file, put online |
| | File contained here is a CRUISE SUMMARY and NOT sumfile. Documentation is online. Files were found in incoming directory under whp_reports. This directory was zipped, files were separated and placed under proper cruise. All of them are sum files. Received 1997 August 15th. | | |
| 06/07/01 | Bartolacci | SUM | Website Updated; Data reformatted & online |
| | I have reformatted the sumfile and replaced the current online file with the newly reformatted one, old version was renamed and moved to the original directory. Edits made Added column for time EVENT CODE and gave entire column UN code. Added NAV code columns and gave entire column UNK code. Aligned STNNBR CASTNO and CAST TYPE columns Added time/name stamp. Deleted reference (ship code 09FA) in first header line. Ran sumchk with no errors. created station navigation file and station track images. | | |
| 06/11/01 | Bartolacci | CTD/BTL/SUM | Data Update |
| | • CTD/BTL/SUM modified to indicate cruise had two legs, see note: I have edited the sum file bottle file and ctd files to indicate that 09FA1089 cruise had two legs.<br>• SUM expocode for stations 1-169 was changed from 09FA1089_2 to 09FA1089_1. stations 171-325 still have expocode 09FA1089_2.<br>• BOT added 09FA1089_1 expocode to first header line.<br>• CTD expocode for stations 1-169 was changed from 09FA1089_2 to 09FA1089_1.<br>All previous files were moved to original directory and renamed to include moving date. | | |
| 06/11/01 | Bartolacci | SUM | Website Updated; Expocodes Updated |
| | Changed primary expocode to 09FA1089_1 and primary chief scientist to Forbes since all but 8 stations (pr11 only) were done on the 09FA1089_1 leg. 09FA1089_2 retained for those 8 stations and sum file updated accordingly. Doc file updated: cruise dates for Principal Investigators changed from 1990 to 1989 to match page one of doc file and all submitted data files. | | |
| 07/19/02 | Uribe | CTD | Data Updated, online |
| | Some CTD files had the wrong leg in the expocode. They were matched with the sumfile. Changes online. | | |
| 08/20/01 | Uribe | BTL | Website Updated exchange File Added |
| | some precessions modified. Bottle file has been converted to exchange format and put online. Certain precessions were modified such as -9. 0 to -9.9999 and -9. to -9.0. The website for this cruise is not accessible through the database search. | | |

| | | | |
|---|---|---|---|
| 02/18/02 | Uribe | CTD | Website Updated, exchange File online |
| | CTD has been converted to exchange and put online. | | |
| 07/22/02 | Uribe | CTD | Website updated; Exchange File Generated, online |
| 11/05/03 | Coartney | Website | Updated; New text doc online |
| 01/29/04 | Kappa | Doc Update | Combined ctd & btl reports, made pdf & text docs |