# BROKE West Survey, Marine Science Cruise AU0603 - Oceanographic Field Measurements and Analysis

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## 1 INTRODUCTION

Oceanographic measurements around the "BROKE West" survey area along the Antarctic continental margin between 30$^o$ and 80$^o$ south were conducted aboard Aurora Australis cruise au0603 (voyage 3 2005/2006, 2nd January to 12th March 2006). A total of 120 CTD vertical profile stations were taken, most to within 15 m of the bottom. Over 2500 Niskin bottle water samples were collected for the measurement of salinity, dissolved oxygen, nutrients (phosphate, nitrate+nitrite, silicate and ammonia), $^{18}O$, dissolved inorganic carbon, alkalinity, particulate organic carbon/nitrogen/silicate, dimethyl sulphide, and biological parameters, using a 24 bottle rosette sampler. Full depth current profiles were collected by an LADCP attached to the CTD package, while near surface current profile data were collected by a ship mounted ADCP. Data from the array of ship's underway sensors are included in the data set.

This report describes the processing/calibration of the CTD and ADCP data, and details the data quality. An offset correction is derived for the underway sea surface temperature and salinity data, by comparison with near surface CTD data. LADCP data are not discussed in this report. Note that the data processor was not a cruise participant, thus this report does not describe all details of the shipboard field data collection or the problems encountered. CTD station positions are shown in Figures 1a and b, while CTD station information is summarised in Table 1. Niskin bottle sampling at each station is summarised in Table 2.

## 2 CTD INSTRUMENTATION

SeaBird SBE9plus CTD serial 704, with dual temperature and conductivity sensors and a single SBE43 dissolved oxygen sensor (on the primary sensor pump line), was used for the entire cruise, mounted on a SeaBird 24 bottle rosette frame, together with a SBE32 24 position pylon and 22 x 10 litre General Oceanics Niskin bottles. The following additional sensors were mounted:

* Benthos model 2110 altimeter
* Tritech 200 kHz and 500 kHz altimeters
* Wetlabs fluorometer serial 296
* photosynthetically active radiation (i.e. PAR) sensor
* Wetlabs C-star transmissometer serial 899DR
* Sontek lowered ADCP (i.e. LADCP) with upward and downward looking transducer sets

CTD data were transmitted up a 6 mm seacable to a SBE11plusV2 deck unit, at a rate of 24 Hz, and data were logged simultaneously on 2 PC's using SeaBird data acquisition software "Seasave". The LADCP was powered by a separate battery pack, and data were logged internally and downloaded after each CTD cast. Note that physical mounting of the upward looking LADCP transucer set requires removal of 2 Niskin bottles, thus only 22 Niskins were fitted for the cruise.

The CTD deployment method was as follows:

* CTD initially deployed down to ~20 m
* after confirmation of pump operation, CTD returned up to just below the surface (depth dependent on sea state)
* after returning to just below the surface, downcast proper commenced

For most casts, the package was stopped for 5 minutes on the upcast at ~50 m above the bottom, for logging of LADCP bottom track data.

Pre cruise temperature, conductivity and pressure calibrations were performed by the CSIRO Division of Marine and Atmoshperic Research calibration facility (Table 3) (July to August 2005). Manufacturer supplied calibrations were used for the dissolved oxygen, fluorometer, transmissometer and altimeters. PAR data are uncalibrated. Final conductivity and dissolved oxygen calibrations derived from in situ Niskin bottle samples are listed later in the report.

## 3 CTD DATA PROCESSING AND CALIBRATION

CTD data were processed in Hobart. The first step is application of a suite of the SeaBird "Seasoft" processing programs to the raw data, in order to:
* convert raw data signals to engineering units
* remove the surface pressure offset for each station
* realign the oxygen sensor with respect to time (note that conductivity sensor alignment is done by the deck unit at the time of data logging)
* remove conductivity cell thermal mass effects
* apply a low pass filter to the pressure data
* flag pressure reversals
* search for bad data (e.g. due to sensor fouling)

Further processing and data calibration were done in a UNIX environment, using a suite of fortran programs. Processing steps here include:
* forming upcast burst CTD data for calibration against bottle data, where each upcast burst is the average of 10 seconds of data prior to each Niskin bottle firing
* merging bottle and CTD data, and deriving CTD conductivity calibration coefficients by comparing upcast CTD burst average conductivity data with calculated equivalent bottle sample conductivities
* forming pressure monotonically increasing data, and from there calculating 2 dbar averaged downcast CTD data
* calculating calibrated 2 dbar averaged salinity from the 2 dbar pressure, temperature and conductivity values
* deriving CTD dissolved oxygen calibration coefficients by comparing bottle sample dissolved oxygen values (collected on the upcast) with CTD dissolved oxygen values from the equivalent 2 dbar downcast pressures

Full details of the data calibration and processing methods are given in Rosenberg et al. (in preparation), referred to hereafter as the *CTD methodology*.

Final station header information, including station positions and sounder depths at the start, bottom and end of each CTD cast, were obtained from underway data for the cruise (see section 6 below). Note the following for the station header information:
* All times are UTC.
* "Start of cast" information is at the commencement of the downcast proper, as described above.
* "Bottom of cast" information is at the maximum pressure value.
* "End of cast" information is when the CTD leaves the water at the end of the cast, as indicated by a drop in salinity values.
* "Start of cast" and "end of cast" sounder depths are calculated at a sound speed of 1456 m/s, with a ship's draught of 7.3 m added.
* For cases where depth information is missing in the underway bathymetry data set, depth values recorded at the time of CTD logging are used (i.e. as read from the Echogram display, with sound speed 1456 m/s).
* "Bottom of cast" depths are calulated from CTD maximum pressure and altimeter value at the bottom of the casts.

Lastly, data were converted to MATLAB format, and final data quality checking was done within MATLAB.

# 4 CTD AND BOTTLE DATA RESULTS AND DATA QUALITY

Data from the primary CTD sensor pair (temperature and conductivity) were used for this cruise.

## 4.1 Conductivity/salinity

The conductivity calibration and equivalent salinity results for the cruise are plotted in Figures 2 and 3, and the derived conductivity calibration coefficients are listed in Tables 4 and 5. International standard seawater batch numbers P144 and P146 were used for salinometer standardisation. The salinometer (Guildline Autosal serial 62549) appeared very stable throughout the cruise, however significant sample scatter occurred during calibration of the CTD conductivity, particularly for shallower samples. The problem was eventually traced to a poor refit of the salinometer, during servicing of the instrument by a contractor prior to the cruise. From Neale Johnston's cruise hydrochemistry report:

"....salinometer gave symptoms of the water bath overheating....when (salinometer) last serviced the sample inlet line was placed too close to the electronics inside the Guildline, which was heating the sample above the bath temperature before the sample was introduced into the bath. The inlet line was moved and the overheating problem did not reoccur."

In general, the problem was worse for shallower samples, as they were typically warmer already. As a result, large station groupings were required for the CTD calibration (Table 4), to ensure sufficient sample coverage for the lower conductivity values in the shallow part of the vertical profiles. Thus the salinity standard deviation value of ~0.0013 (PSS78) from the the salinity calibration in Figure 3 is considered an overestimate of CTD salinity accuracy. Overall, CTD salinity for the cruise should only be considered accurate to 0.002 (PSS78).

Prior to calibration, a small "step" in the CTD/bottle conductivity comparison was noted for stations 60 to 64. The reason for this step could not be determined (i.e. salinometer or CTD? real or error?), particularly as the profile shapes for these stations were different to surrounding stations. The samples were retained for the conductivity calibration, however CTD salinity for these stations should only be considered accurate to 0.0025 (PSS78).

Salinometer instabilities occurred for stations 15 and 48; salinity samples from these stations were rejected for the CTD calibration. In both cases there is sufficient sample coverage from surrounding stations, and thus there is no significant diminishing of salinity accuracy.

## 4.2 Temperature

Primary and secondary CTD temperature data ($t_p$ and $t_s$ respectively) are compared for the cruise in Figure 4. CTD upcast burst data, obtained at each Niskin bottle stop, are used for the comparison. From the figure, there is a very small pressure dependency of $t_p$-$t_s$ for CTD704 of the order 0.0005$^o$C over 5500 dbar. Without some temperature standard for comparison, it cannot be determined whether the 2 temperature sensors have the same or different pressure dependencies. Nevertheless, this pressure dependence lies within the assumed temperature accuracy of 0.001$^o$C (i.e. the accredited temperature accuracy of the CSIRO calibration facility).

## 4.3 Pressure

Surface pressure offsets for each cast (Table 6) were obtained from inspection of the data before the package entered the water.

When creating the 2 dbar bin averages, a minimum attendance of 8 data scans per bin was required. Data transmission faults and buffer overloads resulted in pressure spikes and small data gaps for several stations. As a result several 2 dbar bins have no data, for the following stations:

7, 18, 37, 46, 76, 88, 95, 98

### 4.4 Dissolved oxygen

For casts deeper than 1400 dbar the profiles were split into a shallow and deep part for separate calculation of oxygen calibration coefficients, with a linear interpolation between the 2 calibrations around the split point (see the *CTD methodology* for full details). Casts shallower than 1400 dbar were calibrated as whole profile fits. The CTD oxygen calibration results are plotted in Figure 5, and the derived calibration coefficients are listed in Table 7. Overall the calibrated CTD oxygen agrees with the bottle data to well within 1% of full scale (where full scale is ~400 µmol/l above 750 dbar, and ~270 µmol/l below 750 dbar). Suspect bottle oxygen samples and 2 dbar CTD data (not deleted from the bottle and CTD files) are listed in Tables 8 and 9 respectively.

A significant number of bad bottle oxygen samples occurred for the first half of the CTD stations - specifically, 89 bad samples occurred up to station 58, a much higher bad sample rate than usual. Many of these bad samples were due to sampling error i.e insufficient shaking of samples following addition of reagents. The sampling problem was corrected, and after station 58 only a further 8 bad samples occurred. Bad samples were deleted from the data files. In most cases, sufficient bottle samples remained for calibration of CTD oxygen data.

Further dissolved oxygen data processing notes:

* For station 31, a split point of 1300 dbar was used for the split profile calibration.

* For station 43, all oxygen bottle samples were bad, therefore the CTD oxygen data were unusable.

* For station 58, the top 5 oxygen bottle samples were bad, so the top 36 dbar of CTD oxygen data were unusable.

* For station 97, the bottom 8 bottle oxygen samples were bad, thus the CTD oxygen data below 228 dbar were unusable.

* No bottle oxygen samples were taken at station 119 and 120, thus the CTD oxygen data were unusable.

### 4.5 Fluorescence, PAR, transmittance

All fluorescence and transmittance data have a calibration as supplied by the manufacturer (Table 3). PAR sensor data are uncalibrated. The data have **not** been verified by linkage to other data sources (e.g. chlorophyll-a concentration data, particulate data, etc). For example, unusually high CTD fluorescence values evident at stations 100, 101 and 102 must be verified from Niskin bottle pigment data (P.I. Simon Wright).

### 4.6 Nutrients

Nutrients measured on the cruise were phosphate, total nitrate (i.e. nitrate+nitrite), silicate, and ammonia (only up to station 85). At the time of writing, all phosphate data for the cruise are bad.

Initial phosphate analysis results, using a phosphate standard made in the lab prior to the cruise (referred to as "lab standard" in the following discussion), were all ~10% low. During phosphate analysis runs on the Lachat instrument, samples of standard reference material (SRM) were inserted into each run. Following analysis a "phosphate recovery" correction was attempted for each station, on the assumption that the lab standard was low and the SRM was correct. Note that these corrected phosphate values still showed a scatter of ±3% between different groups of stations. On return to Hobart, both the lab standard and SRM were checked - the lab standard appeared to be correct, and the SRM gave incosistent results on repeat checks. Thus no explanation was found for the low results on the ship, and all phosphate data were unrecoverable.

Suspect nitrate+nitrate and silicate values not deleted from the bottle data files are listed in Table 10. Further data quality notes:

* Nitrate+nitrite values for stations 82 to 88 were all low by ~5 to 8%, and have been removed from the files.

* Nitrate+nitrite values for station 46 are all low by ~3%.

* All nutrient data for station 20 were bad.

* Ammonia data are unverified, and should be used with caution.

### 4.7 Additional CTD data processing/quality notes

* Station 10 - The final elevation at the bottom of the cast is unknown, as the altimeter never came in range. Future processing of the LADCP bottom track data may reveal whether the bottom was within 192 m (i.e. bottom detection range of the LADCP).

* Station 95 - The minimum reliable altimeter reading at the bottom of the cast was 1.6 m, however the CTD operators from the cruise believe there may have been bottom contact. There is no noticeable shift in temperature and conductivity sensor data at the bottom, thus the data are unaffected.

* Station 103 - The CTD was lifted out of the water prematurely, before bottle 24 was fired. It was lowered back down to 10 dbar to fire the bottle.

## 5 ADCP

The hull mounted ADCP on the Aurora Australis is described in Rosenberg (unpublished report, 1999), with the following updates:

(i) There is no longer a Fugro differential GPS system - all GPS data, including heading, come from the Ashtech 3D system.

(ii) Triggering of the 12 kHz sounder and the higher frequency hydroacoustics array are now separate, resulting in a higher ping rate for the ADCP (linked to the higher frequency hydroacoustics array).

Logging parameters and calibration coefficients for the cruise are summarised in Table 11. Current vectors for the cruise are plotted in Figures 6a and b; the apparent vertical current shear error for different ship speed classes is plotted in Figure 7.

Several gaps in the ADCP data occur over the cruise, due to GPS and/or ADCP logging failure. The main gaps are:

1600 on 27th January to 0200 on 28th January
0033 on 31st January to 2233 on 31st January
0000 on 5th February to 2227 on 5th February
1728 on 18th February to 0706 on 19th February

These data gaps cover the times of the following CTD's: 46, 59, 66 (upcast), 67, 68, 69, 70, 71, 91 and 92.

In general, ADCP data are contaminated by ship's motion when the ship accelerates i.e. changes direction or speed. Noise and turbulence often diminish ADCP data quality when the ship travels at speeds greater than ~13 knots, or during rough sea states. Thus the best quality ADCP data is when the ship is steaming in a straight line at a suitable constant speed, and during milder sea conditions. The most reliable data are collected when the ship is "on station" (on station data is defined here as data where ship speed $\leq$ 0.35 m/s).

An erroneous vertical ADCP current shear occurs when the ship is underway. This shear has a magnitude for this cruise of up to ~0.08 m/s over the ADCP current profile (Figure 7). A likely cause for this error is acoustic ringing against a small air/water interface inside the transducer seachest. From Figure 7, when the ship is underway the effect is most significant over bins 1 to 10, and data from these bins should be treated with caution. Also from the figure, when the ship is travelling at ≤ 1 m/s the effect is no longer significant.

## 6 UNDERWAY MEASUREMENTS

Underway data were logged to an Oracle database on the ship. For more information, see the AADC (Antarctic Division Data Centre) website, and the cruise dotzapper (i.e. data quality controller) report for AU0603:

Marine Science Support Data Quality Report, RSV Aurora Australis Voyage 1 2005-2006, Voyage 2 2005-2006, Voyage 3 2005-2006 (BROKE WEST), Belinda Ronai, March 2006. Antarctic Division unpublished report.

1 minute averaged underway data are contained in the files *brokewest.ora* (column formatted text file) and *brokewestora.mat* (matlab format). 10 second instantaneous position and depth data are contained in the files *brokewestbath.alf* (column formatted text file) and *brokewestbathalf.mat* (matlab format).

Bathymetry data were processed by Esmee Van Wijk (Antarctic Division). A sound speed of 1456 m/s was used for ocean depth calculation, and the ship's draught of 7.3 m was accounted for (i.e. depths are from the water surface). Data were only processed from along the transect lines in the BROKE West survey area. In addition, during the cruise 12 kHz data below 5000 m were not logged. As a result, there are many gaps in the underway bathymetry data.

Underway temperature data from the Antarctic Division hull mounted temperature sensor near the sea water inlet are considered reliable. Underway salinity data from the Antarctic Division thermosalinograph in the oceanographic lab have a significant error in colder waters, due to iceing effects in the debubbler (Bronte Tilbrook, CSIRO, personal communication); these salinity data should not be used. Alternative underway salinity data were obtained from a separate CSIRO thermosalinograph in lab 1 (P.I. Bronte Tilbrook, CSIRO), and these data are considered reliable. A correction for the hull mounted temperature sensor and the lab 1 salinity was derived by comparing the underway data to CTD temperature and salinity data at 8 dbar (Figures 8a and b). The following corrections were then applied to the underway data:

$$T = T_{dls} - 0.038$$
$$S = S_{dls} + 0.041$$

for corrected underway temperature and salinity T and S respectively, and uncorrected values $T_{dls}$ and $S_{dls}$.

## REFERENCES


Rosenberg, M., unpublished. *Aurora Australis ADCP data status.* Antarctic Cooperative Research Centre, unpublished report, November 1999. 51 pp.

Rosenberg, M., Fukamachi, Y., Rintoul, S., Church, J., Curran, C., Helmond, I., Miller, K., McLaughlan, D., Berry, K., Johnston, N. and Richman, J., in preparation. *Kerguelen Deep Western Boundary Current Experiment and CLIVAR I9 transect, marine science cruises AU0304 and AU0403 - oceanographic field measurements and analysis.* ACE CRC Research Report.


## ACKNOWLEDGEMENTS


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**<u>Table 1:</u> Summary of station information for cruise au0603. All times UTC; "leg" = BROKE West CTD leg number, "TEST" = test cast, "FSIcal" = calibration cast for the FSI CTD from the Amery Ice Shelf borehole work; "alt" = minimum altimeter value (m), "maxp" = maximum pressure (dbar).**

| | ------------------------start of CTD------------------------------- | | | | | -----------------bottom of CTD----------------- | | | | -------------------end of CTD------------------- | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| station | date | time | latitude | longitude | depth | time | latitude | longitude | depth | time | latitude | longitude | depth | alt | maxp |
| 001 TEST | 06 Jan 2006 | 064038 | 43 38.10 S | 093 04.95 E | - | 074348 | 43 38.26 S | 093 05.67 E | 2679 | 084817 | 43 38.34 S | 093 06.19 E | 2761 | 17.4 | 2701 |
| 002 leg12.1 | 10 Jan 2006 | 154918 | 60 36.08 S | 078 32.22 E | 2971 | 165713 | 60 36.01 S | 078 32.51 E | 3037 | 181920 | 60 35.98 S | 078 32.96 E | - | 10.6 | 3078 |
| 003 leg12.2 | 11 Jan 2006 | 003342 | 60 12.10 S | 077 03.89 E | 2478 | 013525 | 60 12.16 S | 077 04.14 E | 2432 | 024403 | 60 12.08 S | 077 04.40 E | 2481 | 8.1 | 2462 |
| 004 leg12.3 | 11 Jan 2006 | 070804 | 59 47.89 S | 075 36.03 E | 1730 | 074107 | 59 47.82 S | 075 35.88 E | 1685 | 084210 | 59 47.68 S | 075 35.77 E | 1722 | 10.2 | 1698 |
| 005 leg12.4 | 11 Jan 2006 | 120219 | 59 59.68 S | 075 13.12 E | 2091 | 124037 | 59 59.62 S | 075 12.97 E | 2048 | 134622 | 59 59.64 S | 075 12.43 E | 2081 | 10.4 | 2068 |
| 006 leg12.5 | 11 Jan 2006 | 164931 | 60 19.24 S | 074 35.55 E | 2554 | 174018 | 60 19.24 S | 074 35.26 E | 2486 | 185632 | 60 19.22 S | 074 35.22 E | 2553 | 11.9 | 2513 |
| 007 leg12.6 | 11 Jan 2006 | 203923 | 60 23.51 S | 074 27.76 E | 2944 | 214155 | 60 23.53 S | 074 28.03 E | 2898 | 230923 | 60 23.29 S | 074 28.20 E | 2921 | 14.2 | 2932 |
| 008 leg12.7 | 12 Jan 2006 | 013236 | 60 40.69 S | 073 54.17 E | - | 025055 | 60 40.69 S | 073 53.98 E | 3247 | 040712 | 60 40.57 S | 073 54.29 E | 3341 | 13.3 | 3290 |
| 009 leg12.8 | 12 Jan 2006 | 074519 | 61 12.11 S | 072 53.99 E | - | 090423 | 61 12.23 S | 072 54.14 E | 4118 | 103725 | 61 12.36 S | 072 54.73 E | 4237 | 14.6 | 4184 |
| 010 leg12.9 | 12 Jan 2006 | 160632 | 61 18.80 S | 070 20.63 E | - | 173156 | 61 18.59 S | 070 20.93 E | - | 192316 | 61 18.02 S | 070 21.58 E | 4163 | - | 4105 |
| 011 leg12.10 | 13 Jan 2006 | 014127 | 61 25.60 S | 067 47.35 E | 4360 | 025647 | 61 25.20 S | 067 47.50 E | 4359 | 044708 | 61 24.70 S | 067 47.74 E | 4356 | 9.6 | 4437 |
| 012 leg12.11 | 13 Jan 2006 | 101028 | 61 32.60 S | 065 13.78 E | 4458 | 113208 | 61 32.63 S | 065 14.41 E | 4459 | 132912 | 61 32.55 S | 065 15.10 E | 4459 | 18.5 | 4532 |
| 013 leg12.12 | 13 Jan 2006 | 185254 | 61 39.49 S | 062 40.29 E | 4447 | 201125 | 61 39.59 S | 062 40.22 E | 4450 | 221628 | 61 39.58 S | 062 40.28 E | 4447 | 7.5 | 4534 |
| 014 leg12.13 | 14 Jan 2006 | 032913 | 61 46.19 S | 060 07.01 E | 4698 | 050051 | 61 46.19 S | 060 07.04 E | 4699 | 070755 | 61 45.68 S | 060 07.77 E | 4697 | 5.7 | 4793 |
| 015 leg12.14 | 14 Jan 2006 | 122433 | 61 53.07 S | 057 33.33 E | 4805 | 135303 | 61 53.06 S | 057 33.76 E | 4829 | 155024 | 61 52.96 S | 057 34.37 E | 4827 | 15.4 | 4917 |
| 016 leg12.15 | 14 Jan 2006 | 211615 | 62 00.06 S | 055 00.25 E | 4984 | 225735 | 62 00.05 S | 055 00.89 E | 4990 | 011530 | 62 00.16 S | 055 01.42 E | 4986 | 9.4 | 5089 |
| 017 leg12.16 | 15 Jan 2006 | 063034 | 61 59.94 S | 052 30.31 E | - | 081138 | 62 00.25 S | 052 30.83 E | 5137 | 101125 | 62 00.37 S | 052 31.05 E | - | 14.9 | 5235 |
| 018 leg12.17 | 15 Jan 2006 | 202144 | 61 59.99 S | 049 59.64 E | - | 220350 | 62 00.34 S | 049 59.58 E | 5123 | 235206 | 62 00.72 S | 049 59.76 E | - | 10.6 | 5225 |
| 019 leg12.18 | 16 Jan 2006 | 074621 | 61 59.99 S | 047 30.10 E | 5067 | 091326 | 62 00.06 S | 047 30.64 E | 5069 | 111625 | 62 00.03 S | 047 31.29 E | 5068 | 13.7 | 5167 |
| 020 leg12.19 | 16 Jan 2006 | 180138 | 61 59.99 S | 045 00.02 E | 5012 | 193227 | 62 00.14 S | 044 59.99 E | 5016 | 212621 | 62 00.50 S | 045 00.44 E | 5004 | 10.5 | 5114 |
| 021 leg12.20 | 17 Jan 2006 | 033135 | 61 59.93 S | 042 30.22 E | - | 051555 | 62 00.04 S | 042 29.89 E | 5142 | 071647 | 62 00.02 S | 042 29.20 E | - | 13.0 | 5243 |
| 022 leg12.21 | 17 Jan 2006 | 131310 | 62 00.02 S | 040 00.10 E | - | 143957 | 61 59.95 S | 040 00.04 E | 5170 | 164100 | 61 59.68 S | 040 00.31 E | 5170 | 14.8 | 5270 |
| 023 leg12.22 | 17 Jan 2006 | 232628 | 61 59.87 S | 037 30.05 E | 5159 | 011938 | 61 59.53 S | 037 30.35 E | 5163 | 031332 | 61 59.34 S | 037 30.98 E | 5166 | 12.2 | 5265 |
| 024 leg12.23 | 18 Jan 2006 | 085024 | 62 00.02 S | 034 59.90 E | 5094 | 101957 | 62 00.23 S | 034 59.71 E | 5090 | 120034 | 62 00.40 S | 034 59.24 E | 5086 | 15.7 | 5186 |
| 025 leg12.24 | 18 Jan 2006 | 175539 | 61 59.71 S | 032 29.16 E | - | 191628 | 61 59.30 S | 032 29.83 E | 5150 | 211809 | 61 58.79 S | 032 31.80 E | - | 12.4 | 5252 |
| 026 leg12.25 | 19 Jan 2006 | 042454 | 62 00.01 S | 030 00.05 E | - | 060130 | 62 00.05 S | 030 00.27 E | 5175 | 075423 | 62 00.30 S | 030 01.01 E | - | 15.9 | 5274 |
| 027 leg1.1 | 19 Jan 2006 | 133538 | 62 40.00 S | 030 00.36 E | - | 150715 | 62 40.05 S | 030 01.31 E | 5160 | 164552 | 62 40.06 S | 030 02.09 E | - | 15.8 | 5258 |
| 028 leg1.2 | 19 Jan 2006 | 213013 | 63 19.91 S | 030 00.64 E | - | 231114 | 63 19.87 S | 030 01.52 E | 5131 | 005803 | 63 19.90 S | 030 02.60 E | - | 7.3 | 5238 |
| 029 leg1.3 | 20 Jan 2006 | 062621 | 64 00.00 S | 030 00.05 E | 5088 | 080606 | 64 00.02 S | 030 00.19 E | 5086 | 093902 | 64 00.07 S | 030 00.66 E | 5083 | 14.5 | 5184 |
| 030 leg1.4 | 20 Jan 2006 | 150417 | 64 39.99 S | 030 00.20 E | 4965 | 163110 | 64 40.03 S | 030 00.02 E | 4972 | 180408 | 64 40.05 S | 029 59.96 E | 4964 | 13.9 | 5067 |
| 031 leg1.5 | 20 Jan 2006 | 231322 | 65 20.03 S | 030 00.26 E | 4804 | 004732 | 65 19.91 S | 030 01.06 E | 4811 | 023217 | 65 19.66 S | 030 01.61 E | 4806 | 6.9 | 4908 |
| 032 leg1.6 | 21 Jan 2006 | 073819 | 65 59.96 S | 030 00.01 E | 4484 | 085619 | 65 59.83 S | 029 59.76 E | 4500 | 102438 | 65 59.59 S | 029 59.38 E | 4486 | 16.5 | 4577 |
| 033 leg1.7 | 21 Jan 2006 | 144415 | 66 30.01 S | 029 59.89 E | 4224 | 160607 | 66 29.93 S | 029 59.51 E | 4271 | 173612 | 66 29.88 S | 029 59.05 E | 4250 | 14.6 | 4343 |
| 034 leg1.8 | 21 Jan 2006 | 211339 | 66 59.97 S | 029 59.93 E | 4029 | 223530 | 66 59.87 S | 029 59.42 E | 4092 | 000114 | 66 59.87 S | 029 59.12 E | 4080 | 8.4 | 4166 |
| 035 leg1.9 | 22 Jan 2006 | 044146 | 67 30.04 S | 029 59.97 E | 3559 | 055128 | 67 29.93 S | 029 59.38 E | 3584 | 071223 | 67 29.92 S | 029 58.94 E | 3591 | 11.5 | 3640 |
| 036 leg1.10 | 22 Jan 2006 | 112726 | 67 59.84 S | 030 00.81 E | 3707 | 123040 | 67 59.90 S | 030 00.88 E | 3716 | 135912 | 67 59.93 S | 030 00.56 E | 3713 | 15.6 | 3772 |
| 037 leg1.11 | 22 Jan 2006 | 204954 | 68 29.92 S | 029 59.88 E | - | 215754 | 68 29.98 S | 029 59.51 E | 3506 | 231859 | 68 30.01 S | 029 59.49 E | - | 10.8 | 3561 |
| 038 leg1.12 | 23 Jan 2006 | 020457 | 68 41.71 S | 030 00.27 E | 2982 | 030214 | 68 41.50 S | 030 00.56 E | 3000 | 042041 | 68 41.24 S | 030 00.79 E | 2956 | 10.1 | 3043 |
| 039 leg1.13 | 23 Jan 2006 | 062654 | 68 49.86 S | 030 00.08 E | 2512 | 071854 | 68 49.80 S | 030 00.40 E | 2593 | 083310 | 68 49.74 S | 030 00.56 E | 2532 | 10.0 | 2626 |

**Table 1: (cntd)**

| | | ------start of CTD------ | | | | ------bottom of CTD------ | | | | ------end of CTD------ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| station | date | time | latitude | longitude | depth | time | latitude | longitude | depth | time | latitude | longitude | depth | alt | maxp |
| 040 leg1.14 | 23 Jan 2006 | 103800 | 68 55.36 S | 029 59.88 E | 1959 | 111114 | 68 55.47 S | 029 59.69 E | 1977 | 121113 | 68 55.67 S | 029 59.74 E | 1922 | 16.8 | 1990 |
| 041 leg1.15 | 23 Jan 2006 | 133853 | 69 00.69 S | 029 58.63 E | 1254 | 140309 | 69 00.80 S | 029 58.15 E | 1333 | 145526 | 69 01.15 S | 029 56.85 E | 1437 | 15.7 | 1336 |
| 042 leg1.16 | 23 Jan 2006 | 162058 | 69 04.72 S | 029 59.81 E | 820 | 163835 | 69 04.73 S | 029 59.62 E | 865 | 172005 | 69 04.76 S | 029 59.12 E | 908 | 15.1 | 860 |
| 043 leg1.17 | 23 Jan 2006 | 185502 | 69 06.64 S | 029 59.90 E | 267 | 190110 | 69 06.66 S | 029 59.87 E | 267 | 193530 | 69 06.77 S | 029 59.32 E | 279 | 10.8 | 260 |
| 044 leg1.18 | 23 Jan 2006 | 235015 | 69 12.43 S | 029 56.07 E | 211 | 235830 | 69 12.45 S | 029 56.05 E | 228 | 002731 | 69 12.41 S | 029 55.81 E | 252 | 7.6 | 223 |
| 045 leg3.1 | 27 Jan 2006 | 121931 | 62 39.96 S | 040 00.17 E | 5014 | 140627 | 62 40.03 S | 040 00.32 E | 5017 | 155628 | 62 40.07 S | 040 00.37 E | 5014 | 13.8 | 5112 |
| 046 leg3.2 | 27 Jan 2006 | 202659 | 63 19.89 S | 039 59.74 E | 4930 | 220401 | 63 19.58 S | 039 59.55 E | 4936 | 233924 | 63 19.25 S | 039 59.56 E | 4933 | 9.0 | 5035 |
| 047 leg3.3 | 28 Jan 2006 | 044749 | 63 59.98 S | 040 00.05 E | 4829 | 062059 | 63 59.89 S | 040 00.52 E | 4830 | 075821 | 63 59.81 S | 040 01.58 E | 4807 | 7.5 | 4926 |
| 048 leg3.4 | 28 Jan 2006 | 132711 | 64 40.06 S | 040 00.34 E | 4726 | 145146 | 64 40.07 S | 040 00.42 E | 4726 | 164601 | 64 39.91 S | 040 00.60 E | 4719 | 14.4 | 4812 |
| 049 leg3.5 | 28 Jan 2006 | 215940 | 65 20.28 S | 040 00.23 E | 4735 | 233258 | 65 20.41 S | 040 00.69 E | 4745 | 011222 | 65 20.56 S | 040 01.03 E | 4740 | 10.4 | 4836 |
| 050 leg3.6 | 29 Jan 2006 | 053407 | 66 00.05 S | 040 00.25 E | 4484 | 065903 | 66 00.20 S | 040 00.30 E | 4488 | 084702 | 66 00.04 S | 039 59.75 E | 4489 | 7.4 | 4575 |
| 051 leg3.7 | 29 Jan 2006 | 125754 | 66 30.03 S | 040 00.04 E | 4520 | 141935 | 66 30.00 S | 040 00.09 E | 4524 | 160250 | 66 29.93 S | 040 00.02 E | 4519 | 9.4 | 4610 |
| 052 leg3.8 | 29 Jan 2006 | 193243 | 67 00.08 S | 039 59.81 E | 3632 | 204614 | 66 59.98 S | 039 59.17 E | 3656 | 222118 | 67 00.05 S | 039 57.74 E | 3704 | 8.8 | 3716 |
| 053 leg3.9 | 30 Jan 2006 | 030751 | 67 29.96 S | 039 59.56 E | 3222 | 041051 | 67 30.10 S | 039 58.99 E | 3244 | 054327 | 67 30.16 S | 039 58.22 E | 3207 | 8.4 | 3294 |
| 054 leg3.10 | 30 Jan 2006 | 094828 | 67 56.49 S | 039 59.78 E | 2216 | 102545 | 67 56.47 S | 039 59.96 E | 2244 | 112404 | 67 56.51 S | 039 59.68 E | 2141 | 13.0 | 2267 |
| 055 leg3.11 | 30 Jan 2006 | 132348 | 68 02.87 S | 039 59.95 E | 1521 | 140339 | 68 03.08 S | 039 59.68 E | 1804 | 144947 | 68 03.21 S | 039 59.58 E | 1800 | 14.1 | 1817 |
| 056 leg3.12 | 30 Jan 2006 | 164232 | 68 07.89 S | 040 00.11 E | 979 | 170149 | 68 07.98 S | 040 00.04 E | 999 | 174236 | 68 08.21 S | 040 00.04 E | 798 | 10.6 | 1001 |
| 057 leg3.13 | 30 Jan 2006 | 191333 | 68 08.66 S | 040 00.05 E | 508 | 192922 | 68 08.77 S | 039 59.91 E | 485 | 201311 | 68 08.83 S | 039 59.58 E | 415 | 10.8 | 480 |
| 058 leg3.14 | 30 Jan 2006 | 215649 | 68 11.83 S | 040 00.35 E | 309 | 220832 | 68 11.83 S | 040 00.20 E | 323 | 224556 | 68 11.68 S | 040 00.34 E | 313 | 6.9 | 320 |
| 059 leg3.15 | 31 Jan 2006 | 003447 | 68 20.86 S | 039 59.74 E | 310 | 004549 | 68 20.86 S | 039 59.63 E | 315 | 011755 | 68 20.78 S | 039 59.33 E | 315 | 9.0 | 310 |
| 060 leg5.1 | 03 Feb 2006 | 014151 | 62 40.06 S | 049 59.99 E | 4995 | 032859 | 62 40.37 S | 049 59.96 E | 4994 | 051629 | 62 40.58 S | 049 59.59 E | 4992 | 10.4 | 5093 |
| 061 leg5.2 | 03 Feb 2006 | 094942 | 63 20.08 S | 050 00.00 E | 4843 | 112128 | 63 19.99 S | 049 59.74 E | 4845 | 132041 | 63 19.87 S | 049 59.42 E | 4842 | 15.8 | 4933 |
| 062 leg5.3 | 03 Feb 2006 | 185425 | 64 00.13 S | 049 59.80 E | - | 202249 | 63 59.92 S | 049 59.44 E | 4392 | 215300 | 63 59.62 S | 049 59.17 E | 4410 | 10.8 | 4471 |
| 063 leg5.4 | 04 Feb 2006 | 031904 | 64 30.65 S | 049 59.60 E | - | 044527 | 64 30.73 S | 049 58.99 E | 4272 | 061244 | 64 30.66 S | 049 58.52 E | - | 10.8 | 4348 |
| 064 leg5.5 | 04 Feb 2006 | 115030 | 65 00.05 S | 049 59.81 E | 2542 | 123726 | 64 59.97 S | 049 59.54 E | 2563 | 134342 | 64 59.98 S | 049 59.15 E | 2542 | 15.7 | 2588 |
| 065 leg5.6 | 04 Feb 2006 | 183056 | 65 22.80 S | 049 59.90 E | - | 190657 | 65 22.76 S | 049 59.74 E | 2029 | 201805 | 65 22.78 S | 049 58.97 E | - | 4.3 | 2055 |
| 066 leg5.7 | 04 Feb 2006 | 231535 | 65 37.14 S | 049 59.20 E | 2001 | 235949 | 65 37.24 S | 049 59.10 E | 2018 | 010113 | 65 37.40 S | 049 59.04 E | 1999 | 10.6 | 2038 |
| 067 leg5.8 | 05 Feb 2006 | 025740 | 65 51.76 S | 049 59.09 E | 1557 | 033807 | 65 52.03 S | 049 59.09 E | 1658 | 043509 | 65 52.30 S | 049 58.45 E | 1685 | 10.4 | 1671 |
| 068 leg5.9 | 05 Feb 2006 | 061618 | 66 00.47 S | 049 59.64 E | 935 | 063955 | 66 00.57 S | 049 59.02 E | 934 | 072103 | 66 00.68 S | 049 58.19 E | 854 | 13.6 | 932 |
| 069 leg5.10 | 05 Feb 2006 | 085454 | 66 01.63 S | 049 59.82 E | 489 | 090909 | 66 01.66 S | 049 59.65 E | 514 | 094447 | 66 01.73 S | 049 59.32 E | 496 | 7.7 | 512 |
| 070 leg5.11 | 05 Feb 2006 | 130609 | 66 05.57 S | 049 59.33 E | 253 | 131208 | 66 05.53 S | 049 59.24 E | 265 | 133829 | 66 05.45 S | 049 58.93 E | 253 | 12.6 | 255 |
| 071 leg5.12 | 05 Feb 2006 | 160834 | 66 20.35 S | 050 09.22 E | 172 | 161414 | 66 20.35 S | 050 09.23 E | 181 | 164429 | 66 20.32 S | 050 09.22 E | 172 | 12.1 | 171 |
| 072 leg7.1 | 08 Feb 2006 | 045508 | 62 19.91 S | 059 59.91 E | 4664 | 063043 | 62 19.98 S | 060 00.14 E | 4672 | 082722 | 62 20.44 S | 060 00.24 E | - | 16.1 | 4754 |
| 073 leg7.2 | 08 Feb 2006 | 153231 | 62 59.96 S | 060 00.28 E | - | 164924 | 62 59.95 S | 060 00.42 E | 4466 | 184222 | 63 00.20 S | 060 00.94 E | - | 10.1 | 4548 |
| 074 leg7.3 | 09 Feb 2006 | 010614 | 63 40.07 S | 060 00.11 E | 4368 | 023022 | 63 40.20 S | 060 00.28 E | 4375 | 040756 | 63 40.26 S | 060 00.52 E | 4376 | 10.4 | 4454 |
| 075 leg7.4 | 09 Feb 2006 | 090136 | 64 19.99 S | 059 59.99 E | 4226 | 101920 | 64 20.23 S | 059 59.98 E | 4229 | 120327 | 64 20.62 S | 060 00.05 E | 4224 | 10.8 | 4304 |
| 076 leg7.5 | 09 Feb 2006 | 182418 | 65 00.14 S | 060 00.25 E | 4039 | 194401 | 65 00.32 S | 060 00.56 E | 4042 | 211210 | 65 00.66 S | 060 00.94 E | 4040 | 4.9 | 4117 |
| 077 leg7.6 | 10 Feb 2006 | 005654 | 65 29.95 S | 059 59.86 E | 3801 | 021117 | 65 29.97 S | 059 59.87 E | 3812 | 034101 | 65 30.06 S | 059 59.77 E | 3799 | 6.0 | 3879 |
| 078 leg7.7 | 10 Feb 2006 | 083215 | 65 59.99 S | 059 59.84 E | 2676 | 092259 | 66 00.17 S | 059 59.68 E | 2675 | 103404 | 66 00.18 S | 059 59.53 E | 2657 | 11.5 | 2708 |
| 079 leg7.8 | 10 Feb 2006 | 141345 | 66 18.89 S | 059 59.95 E | - | 150809 | 66 18.86 S | 059 59.97 E | 2675 | 163150 | 66 18.82 S | 059 59.95 E | 2686 | 12.9 | 2706 |
| 080 leg7.9 | 10 Feb 2006 | 193215 | 66 30.03 S | 059 59.61 E | 1783 | 201230 | 66 30.01 S | 059 58.87 E | 1845 | 211812 | 66 29.90 S | 059 57.64 E | 1717 | 15.7 | 1856 |

**<u>Table 1:</u> (cntd)**

| | | ------start of CTD------ | | | | ------bottom of CTD------ | | | | ------end of CTD------ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| station | date | time | latitude | longitude | depth | time | latitude | longitude | depth | time | latitude | longitude | depth | alt | maxp |
| 081 leg7.10 | 10 Feb 2006 | 230902 | 66 33.41 S | 059 59.28 E | 1327 | 234538 | 66 33.41 S | 059 58.73 E | 1391 | 003852 | 66 33.43 S | 059 58.07 E | 1318 | 9.4 | 1400 |
| 082 leg7.11 | 11 Feb 2006 | 021048 | 66 39.70 S | 059 59.71 E | 895 | 023431 | 66 39.63 S | 059 59.07 E | 936 | 032215 | 66 39.68 S | 059 58.03 E | 861 | 11.1 | 937 |
| 083 leg7.12 | 11 Feb 2006 | 051757 | 66 40.94 S | 059 59.58 E | 453 | 053148 | 66 40.94 S | 059 59.44 E | 472 | 060511 | 66 40.84 S | 059 58.51 E | 457 | 10.0 | 468 |
| 084 leg7.13 | 11 Feb 2006 | 080532 | 66 54.04 S | 060 00.03 E | 409 | 081321 | 66 54.04 S | 059 59.98 E | 475 | 085250 | 66 54.14 S | 059 59.52 E | 586 | 15.7 | 465 |
| 085 leg7.14 | 11 Feb 2006 | 104905 | 66 55.94 S | 059 56.39 E | 931 | 111141 | 66 55.96 S | 059 56.38 E | 940 | 115829 | 66 55.99 S | 059 56.35 E | 933 | 15.8 | 936 |
| 086 leg9.1 | 17 Feb 2006 | 003704 | 61 59.95 S | 069 59.99 E | 4119 | 015426 | 61 59.90 S | 069 59.60 E | 4124 | 032828 | 62 00.01 S | 069 59.24 E | - | 8.4 | 4196 |
| 087 leg9.2 | 17 Feb 2006 | 100350 | 62 40.04 S | 070 00.01 E | 4036 | 120702 | 62 40.03 S | 069 59.28 E | 4045 | 135135 | 62 40.04 S | 069 59.74 E | 4038 | 11.3 | 4113 |
| 088 leg9.3 | 17 Feb 2006 | 202006 | 63 20.21 S | 069 59.36 E | 3830 | 213831 | 63 20.24 S | 069 59.12 E | 3840 | 225856 | 63 20.17 S | 069 59.17 E | 3835 | 6.2 | 3907 |
| 089 leg9.4 | 18 Feb 2006 | 063006 | 63 59.77 S | 070 00.04 E | 3506 | 073553 | 63 59.49 S | 070 00.02 E | 3510 | 090639 | 63 59.34 S | 070 00.05 E | 3507 | 6.8 | 3568 |
| 090 leg9.5 | 18 Feb 2006 | 123138 | 64 29.99 S | 069 59.89 E | 3237 | 133424 | 64 29.98 S | 069 59.98 E | 3241 | 144642 | 64 29.90 S | 070 00.07 E | 3235 | 12.1 | 3287 |
| 091 leg9.6 | 18 Feb 2006 | 222317 | 64 59.87 S | 069 59.80 E | 2907 | 231658 | 64 59.68 S | 069 59.33 E | 2918 | 002859 | 64 59.56 S | 069 58.73 E | 2907 | 4.7 | 2963 |
| 092 leg9.7 | 19 Feb 2006 | 035616 | 65 30.10 S | 069 59.78 E | 2707 | 045337 | 65 30.13 S | 069 59.91 E | 2727 | 061229 | 65 30.17 S | 069 59.38 E | 2692 | 9.4 | 2763 |
| 093 leg9.8 | 19 Feb 2006 | 113534 | 66 00.04 S | 069 59.78 E | 2409 | 121638 | 66 00.07 S | 069 59.64 E | 2423 | 132119 | 66 00.05 S | 070 00.14 E | 2424 | 11.0 | 2451 |
| 094 leg9.9 | 19 Feb 2006 | 154312 | 66 14.99 S | 069 59.69 E | 2291 | 162819 | 66 14.96 S | 069 59.03 E | 2295 | 172624 | 66 14.90 S | 069 58.34 E | 2287 | 8.6 | 2322 |
| 095 leg9.10 | 19 Feb 2006 | 202839 | 66 30.38 S | 069 59.99 E | 1984 | 210058 | 66 30.35 S | 069 59.93 E | 1991 | 220604 | 66 30.20 S | 069 59.44 E | 1983 | 1.6 | 2020 |
| 096 leg9.11 | 19 Feb 2006 | 235953 | 66 43.68 S | 069 59.95 E | 1520 | 002536 | 66 43.64 S | 069 59.89 E | 1533 | 011742 | 66 43.70 S | 069 59.47 E | 1520 | 8.1 | 1546 |
| 097 leg9.12 | 20 Feb 2006 | 041205 | 66 49.19 S | 070 00.27 E | 1039 | 043051 | 66 49.24 S | 069 59.97 E | 1031 | 051558 | 66 49.39 S | 069 59.49 E | 950 | 7.1 | 1037 |
| 098 leg9.13 | 20 Feb 2006 | 072453 | 66 52.56 S | 069 59.96 E | 500 | 073712 | 66 52.59 S | 069 59.98 E | 508 | 080950 | 66 52.67 S | 070 00.09 E | 495 | 13.4 | 501 |
| 099 leg9.14 | 20 Feb 2006 | 105028 | 67 10.84 S | 070 00.35 E | 267 | 105652 | 67 10.81 S | 070 00.37 E | 273 | 112915 | 67 10.61 S | 070 00.27 E | 281 | 15.6 | 260 |
| 100 leg9.15 | 20 Feb 2006 | 181730 | 67 18.80 S | 070 59.47 E | 383 | 182619 | 67 18.73 S | 070 59.38 E | 394 | 190957 | 67 18.25 S | 070 59.53 E | 394 | 9.4 | 390 |
| 101 leg9.16 | 20 Feb 2006 | 234408 | 67 19.29 S | 071 58.69 E | 565 | 235826 | 67 19.29 S | 071 58.75 E | 571 | 003611 | 67 19.19 S | 071 58.59 E | 567 | 8.1 | 570 |
| 102 leg9.17 | 21 Feb 2006 | 042559 | 67 19.16 S | 073 00.12 E | 546 | 043559 | 67 19.19 S | 073 00.01 E | 554 | 051852 | 67 19.29 S | 072 59.76 E | 549 | 7.8 | 553 |
| 103 leg11.1 | 24 Feb 2006 | 030200 | 60 59.97 S | 080 00.26 E | 2628 | 035022 | 60 59.72 S | 080 00.24 E | 2634 | 045617 | 60 59.46 S | 080 00.08 E | 2629 | 6.6 | 2670 |
| 104 leg11.2 | 24 Feb 2006 | 101434 | 61 39.77 S | 080 00.14 E | 2328 | 110047 | 61 39.77 S | 080 00.05 E | 2332 | 120214 | 61 39.74 S | 079 59.77 E | 2328 | 16.2 | 2352 |
| 105 leg11.3 | 24 Feb 2006 | 174755 | 62 20.01 S | 079 59.91 E | 2468 | 183019 | 62 20.04 S | 079 59.60 E | 2480 | 193957 | 62 20.14 S | 079 59.12 E | 2478 | 6.1 | 2513 |
| 106 leg11.4 | 25 Feb 2006 | 102953 | 63 00.07 S | 079 59.97 E | 3495 | 113437 | 63 00.16 S | 080 00.14 E | 3504 | 125337 | 63 00.16 S | 080 00.62 E | 3470 | 10.6 | 3558 |
| 107 leg11.5 | 25 Feb 2006 | 172259 | 63 29.98 S | 079 59.75 E | - | 182226 | 63 30.09 S | 080 00.05 E | 3538 | 194037 | 63 30.11 S | 080 00.14 E | 3522 | 9.8 | 3593 |
| 108 leg11.6 | 25 Feb 2006 | 232200 | 64 00.05 S | 079 59.65 E | 3642 | 001935 | 64 00.13 S | 080 00.13 E | 3650 | 013636 | 64 00.20 S | 080 00.73 E | 3645 | 8.2 | 3710 |
| 109 leg11.7 | 26 Feb 2006 | 060242 | 64 30.03 S | 079 59.86 E | 3603 | 071538 | 64 29.99 S | 079 59.66 E | 3608 | 084047 | 64 29.92 S | 079 59.77 E | 3604 | 13.5 | 3662 |
| 110 leg11.8 | 26 Feb 2006 | 124756 | 65 00.02 S | 079 59.96 E | 3535 | 135709 | 65 00.08 S | 079 59.82 E | 3546 | 151217 | 65 00.36 S | 079 59.18 E | 3539 | 13.4 | 3598 |
| 111 leg11.9 | 26 Feb 2006 | 194141 | 65 30.28 S | 080 00.12 E | 3221 | 203655 | 65 30.64 S | 079 59.98 E | 3227 | 220027 | 65 31.07 S | 079 59.39 E | 3223 | 7.9 | 3277 |
| 112 leg11.10 | 27 Feb 2006 | 014929 | 65 49.13 S | 079 59.64 E | - | 022701 | 65 49.28 S | 079 59.52 E | 2223 | 033324 | 65 49.54 S | 079 59.27 E | 2203 | 11.0 | 2246 |
| 113 leg11.11 | 27 Feb 2006 | 053254 | 65 51.10 S | 079 59.96 E | 1962 | 061503 | 65 51.10 S | 079 59.81 E | 2003 | 070824 | 65 51.01 S | 079 59.43 E | 1998 | 6.9 | 2026 |
| 114 leg11.12 | 27 Feb 2006 | 095456 | 65 57.10 S | 079 59.78 E | 1512 | 102646 | 65 57.18 S | 079 59.51 E | 1554 | 112255 | 65 57.37 S | 079 58.83 E | 1499 | 9.4 | 1567 |
| 115 leg11.13 | 27 Feb 2006 | 131325 | 66 01.42 S | 079 59.77 E | 1097 | 133422 | 66 01.47 S | 079 59.80 E | 1097 | 141618 | 66 01.54 S | 079 59.67 E | 1064 | 10.3 | 1101 |
| 116 leg11.14 | 27 Feb 2006 | 161113 | 66 07.91 S | 079 58.50 E | 518 | 163012 | 66 07.97 S | 079 58.20 E | 524 | 170942 | 66 08.06 S | 079 57.61 E | 513 | 5.0 | 526 |
| 117 leg11.15 | 27 Feb 2006 | 210958 | 66 24.63 S | 079 59.40 E | 223 | 211702 | 66 24.59 S | 079 59.29 E | 228 | 215023 | 66 24.50 S | 079 58.64 E | 222 | 11.7 | 219 |
| 118 leg11.16 | 28 Feb 2006 | 014437 | 66 44.71 S | 080 00.62 E | 324 | 015103 | 66 44.72 S | 080 00.63 E | 328 | 022204 | 66 44.83 S | 080 00.53 E | 326 | 7.7 | 324 |
| 119 FSIcal | 03 Mar 2006 | 073651 | 66 04.97 S | 079 27.91 E | 1497 | 080319 | 66 05.04 S | 079 27.74 E | 1541 | 084731 | 66 05.10 S | 079 27.38 E | 1504 | 10.3 | 1552 |
| 120 FSIcal | 03 Mar 2006 | 092302 | 66 05.11 S | 079 27.58 E | 1476 | 095403 | 66 05.24 S | 079 27.24 E | 1522 | 104741 | 66 05.45 S | 079 27.03 E | 1570 | 12.1 | 1531 |

**<u>Table 2:</u> Cruise au0603 summary of samples drawn from Niskin bottles at each station, including salinity (sal), dissolved oxygen (do), nutrients (nut) (i.e. phosphate, nitrate+nitrite, silicate), ammonia ($NH_3$), dissolved inorganic carbon (dic) and alkalinity (alk), oxygen-18 ($^{18}O$), particulate carbon and particulate nitrogen and particulate silicate (POC/N/Si), dimethyl sulphide (dms), HPLC (i.e. pigments), lugols iodine fixed algal counts (lug), gluteraldehyde fixed samples for electron microscopy (em), gluteraldehyde fixed samples for bacteria (gbac), carbon-14 ($^{14}C$), and viruses from Wright et al. group (vir). Note that 1=samples taken, 0=no samples taken, 2=surface sample only. Additional biological parameters not listed in the table include samples for flow cytometry, bacteria genetics, viruses sampled by Danny Ashcroft, viscosity, and bio-optics.**

| station | sal | do | nut | $NH_3$ | dic | alk | $^{18}O$ | POC/N/Si | dms | HPLC | lug | em | gbac | $^{14}C$ | vir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 5 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 6 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 7 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 10 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 11 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 12 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 13 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 14 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 15 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 16 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 17 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 18 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 19 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 20 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 21 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 22 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 23 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 24 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 25 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 26 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 27 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 28 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 29 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 30 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 31 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 32 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 33 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 34 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 35 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 36 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 37 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 38 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 39 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 40 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 41 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 42 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 43 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 44 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 45 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 46 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 47 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 48 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 49 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 50 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 51 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 52 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 53 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 54 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 55 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

**Table 2: (continued)**

| station | sal | do | nut | $NH_3$ | dic | alk | $^{18}O$ | POC/N/Si | dms | HPLC | lug | em | gbac | $^{14}C$ | vir |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 57 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 58 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 59 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 60 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 61 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 62 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 63 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 64 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 65 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 66 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 67 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 68 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 69 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 70 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 71 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 72 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 73 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 74 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 75 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 76 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 77 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 78 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 79 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 80 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 81 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 82 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 83 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 84 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 85 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 86 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 87 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 88 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 89 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 90 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 91 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 92 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 93 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 94 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 95 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 96 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 97 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 98 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 99 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 100 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 101 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 102 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 103 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 104 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 105 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 106 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 107 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 108 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 109 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 110 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 111 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 112 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 113 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 114 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |
| 115 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 116 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| 117 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 118 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 119 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 120 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 3: CTD serial 704 calibration coefficients and calibration dates for cruise au0603. Note that platinum temperature calibrations are for the ITS-90 scale. Pressure slope/offset, temperature and conductivity values are from the CSIRO Division of Marine and Atmospheric Research calibration facility. Remaining values are manufacturer supplied.**

*Primary Temperature, serial 4248, 26/07/2005*

| | |
|---|---|
| G | : 4.3871123e-003 |
| H | : 6.5052040e-004 |
| I | : 2.2944734e-005 |
| J | : 1.7823539e-006 |
| F0 | : 1000.000 |
| Slope | : 1.00000000 |
| Offset | : 0.0000 |

*Secondary Temperature, serial 4246, 26/07/2005*

| | |
|---|---|
| G | : 3.9792308e-003 |
| H | : 6.2199100e-004 |
| I | : 1.8925560e-005 |
| J | : 1.6721644e-006 |
| F0 | : 1000.000 |
| Slope | : 1.00000000 |
| Offset | : 0.0000 |

*Primary Conductivity, serial 2977, 26/07/2005*

| | |
|---|---|
| G | : -1.0699102e+001 |
| H | : 1.4736757e+000 |
| I | : 3.3457988e-003 |
| J | : -1.8473099e-004 |
| CTcor | : 3.2500e-006 |
| CPcor | : -9.57000000e-008 |
| Slope | : 1.00000000 |
| Offset | : 0.00000 |

*Secondary Conductivity, serial 2808, 26/07/2005*

| | |
|---|---|
| G | : -9.2842298e+000 |
| H | : 1.4245489e+000 |
| I | : 1.1906212e-004 |
| J | : 7.4562350e-005 |
| CTcor | : 3.2500e-006 |
| CPcor | : -9.57000000e-008 |
| Slope | : 1.00000000 |
| Offset | : 0.00000 |

*Pressure, serial 89084, 23/07/2004*

| | |
|---|---|
| C1 | : -5.337692e+004 |
| C2 | : -5.768735e-001 |
| C3 | : 1.541700e-002 |
| D1 | : 3.853800e-002 |
| D2 | : 0.000000e+000 |
| T1 | : 2.984003e+001 |
| T2 | : -4.090591e-004 |
| T3 | : 3.693030e-006 |
| T4 | : 3.386020e-009 |
| T5 | : 0.000000e+000 |
| *(22/08/2005 for pressure slope/offset)* | |
| Slope | : 1.00006101 |
| Offset | : 0.73719 |
| AD590M | : 1.283280e-002 |
| AD590B | : -9.705660e+000 |

*Oxygen, serial 0178, 26/07/2004*

| | |
|---|---|
| Soc | : 5.2230e-001 |
| Boc | : 0.0000 |
| Offset | : -0.4914 |
| Tcor | : 0.0021 |
| Pcor | : 1.35e-004 |
| Tau | : 0.0 |

*Fluorometer, serial 296, 23/05/2005*

| | |
|---|---|
| Vblank | : 0.12 |
| Scale factor | : 7.000e+000 |

*Transmissometer, serial 899DR*

| | |
|---|---|
| A0 | : -0.0130705 |
| A1 | : 0.214270 |

**Table 4: CTD conductivity calibration coefficients. $F_1$ , $F_2$ and $F_3$ are respectively conductivity bias, slope and station-dependent correction calibration terms. n is the number of samples retained for calibration in each station grouping; $\sigma$ is the standard deviation of the conductivity residual for the n samples in the station grouping.**

| stn grouping | $F_1$ | $F_2$ | $F_3$ | n | $\sigma$ |
|---|---|---|---|---|---|
| 001 to 008 | 0.60848557E-02 | 0.99970030E-03 | -0.52078625E-08 | 151 | 0.000830 |
| 009 to 038 | 0.13009766E-01 | 0.99942691E-03 | -0.88263702E-10 | 489 | 0.000794 |
| 039 to 059 | 0.11348442E-01 | 0.99958755E-03 | -0.19812640E-08 | 303 | 0.001237 |
| 060 to 073 | 0.72429942E-02 | 0.99947385E-03 | 0.14586309E-08 | 248 | 0.001626 |
| 074 to 120 | 0.41993984E-02 | 0.99971942E-03 | -0.95881876E-10 | 791 | 0.000816 |

**Table 5:** **Station-dependent-corrected conductivity slope term ($F_2 + F_3 . N$), for station number N, and $F_2$ and $F_3$ the conductivity slope and station-dependent correction calibration terms respectively.**

| station number | $(F_2 + F_3 . N)$ | station number | $(F_2 + F_3 . N)$ | station number | $(F_2 + F_3 . N)$ | station number | $(F_2 + F_3 . N)$ |
|---|---|---|---|---|---|---|---|
| 1 | 0.99969510E-03 | 31 | 0.99942417E-03 | 61 | 0.99956282E-03 | 91 | 0.99970820E-03 |
| 2 | 0.99968989E-03 | 32 | 0.99942408E-03 | 62 | 0.99956428E-03 | 92 | 0.99970811E-03 |
| 3 | 0.99968468E-03 | 33 | 0.99942400E-03 | 63 | 0.99956574E-03 | 93 | 0.99970803E-03 |
| 4 | 0.99967947E-03 | 34 | 0.99942391E-03 | 64 | 0.99956720E-03 | 94 | 0.99970794E-03 |
| 5 | 0.99967427E-03 | 35 | 0.99942382E-03 | 65 | 0.99956866E-03 | 95 | 0.99970786E-03 |
| 6 | 0.99966906E-03 | 36 | 0.99942373E-03 | 66 | 0.99957012E-03 | 96 | 0.99970777E-03 |
| 7 | 0.99966385E-03 | 37 | 0.99942364E-03 | 67 | 0.99957157E-03 | 97 | 0.99970769E-03 |
| 8 | 0.99965864E-03 | 38 | 0.99942356E-03 | 68 | 0.99957303E-03 | 98 | 0.99970761E-03 |
| 9 | 0.99942611E-03 | 39 | 0.99951028E-03 | 69 | 0.99957449E-03 | 99 | 0.99970752E-03 |
| 10 | 0.99942603E-03 | 40 | 0.99950830E-03 | 70 | 0.99957595E-03 | 100 | 0.99970744E-03 |
| 11 | 0.99942594E-03 | 41 | 0.99950631E-03 | 71 | 0.99957741E-03 | 101 | 0.99970735E-03 |
| 12 | 0.99942585E-03 | 42 | 0.99950433E-03 | 72 | 0.99957887E-03 | 102 | 0.99970727E-03 |
| 13 | 0.99942576E-03 | 43 | 0.99950235E-03 | 73 | 0.99958033E-03 | 103 | 0.99970718E-03 |
| 14 | 0.99942567E-03 | 44 | 0.99950037E-03 | 74 | 0.99970963E-03 | 104 | 0.99970710E-03 |
| 15 | 0.99942559E-03 | 45 | 0.99949839E-03 | 75 | 0.99970955E-03 | 105 | 0.99970701E-03 |
| 16 | 0.99942550E-03 | 46 | 0.99949641E-03 | 76 | 0.99970946E-03 | 106 | 0.99970693E-03 |
| 17 | 0.99942541E-03 | 47 | 0.99949443E-03 | 77 | 0.99970938E-03 | 107 | 0.99970684E-03 |
| 18 | 0.99942532E-03 | 48 | 0.99949245E-03 | 78 | 0.99970930E-03 | 108 | 0.99970676E-03 |
| 19 | 0.99942523E-03 | 49 | 0.99949046E-03 | 79 | 0.99970921E-03 | 109 | 0.99970668E-03 |
| 20 | 0.99942514E-03 | 50 | 0.99948848E-03 | 80 | 0.99970913E-03 | 110 | 0.99970659E-03 |
| 21 | 0.99942506E-03 | 51 | 0.99948650E-03 | 81 | 0.99970904E-03 | 111 | 0.99970651E-03 |
| 22 | 0.99942497E-03 | 52 | 0.99948452E-03 | 82 | 0.99970896E-03 | 112 | 0.99970642E-03 |
| 23 | 0.99942488E-03 | 53 | 0.99948254E-03 | 83 | 0.99970887E-03 | 113 | 0.99970634E-03 |
| 24 | 0.99942479E-03 | 54 | 0.99948056E-03 | 84 | 0.99970879E-03 | 114 | 0.99970625E-03 |
| 25 | 0.99942470E-03 | 55 | 0.99947858E-03 | 85 | 0.99970870E-03 | 115 | 0.99970617E-03 |
| 26 | 0.99942461E-03 | 56 | 0.99947660E-03 | 86 | 0.99970862E-03 | 116 | 0.99970608E-03 |
| 27 | 0.99942453E-03 | 57 | 0.99947461E-03 | 87 | 0.99970853E-03 | 117 | 0.99970600E-03 |
| 28 | 0.99942444E-03 | 58 | 0.99947263E-03 | 88 | 0.99970845E-03 | 118 | 0.99970591E-03 |
| 29 | 0.99942435E-03 | 59 | 0.99947065E-03 | 89 | 0.99970837E-03 | 119 | 0.99970583E-03 |
| 30 | 0.99942426E-03 | 60 | 0.99956136E-03 | 90 | 0.99970828E-03 | 120 | 0.99970575E-03 |

**Table 6:** **Surface pressure offsets (i.e. poff, in dbar). For each station, these values are subtracted from the pressure calibration "offset" value from Table 3.**

| stn | poff | stn | poff | stn | poff | stn | poff | stn | poff | stn | poff |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.50 | 21 | 0.20 | 41 | 0.02 | 61 | 0.07 | 81 | 0.10 | 101 | 0.37 |
| 2 | 0.21 | 22 | 0.17 | 42 | -0.02 | 62 | 0.12 | 82 | 0.15 | 102 | 0.33 |
| 3 | 0.08 | 23 | 0.23 | 43 | 0.04 | 63 | 0.12 | 83 | 0.13 | 103 | 0.18 |
| 4 | 0.09 | 24 | 0.24 | 44 | 0.32 | 64 | 0.24 | 84 | 0.15 | 104 | 0.21 |
| 5 | 0.11 | 25 | 0.23 | 45 | 0.27 | 65 | 0.23 | 85 | 0.13 | 105 | 0.19 |
| 6 | 0.05 | 26 | 0.28 | 46 | 0.16 | 66 | 0.17 | 86 | 0.18 | 106 | 0.20 |
| 7 | 0.09 | 27 | 0.27 | 47 | 0.14 | 67 | 0.16 | 87 | 0.26 | 107 | 0.22 |
| 8 | 0.11 | 28 | 0.33 | 48 | 0.06 | 68 | 0.14 | 88 | 0.23 | 108 | 0.16 |
| 9 | 0.16 | 29 | 0.28 | 49 | 0.14 | 69 | 0.22 | 89 | 0.26 | 109 | 0.21 |
| 10 | 0.26 | 30 | 0.33 | 50 | 0.17 | 70 | 0.26 | 90 | 0.18 | 110 | 0.23 |
| 11 | 0.27 | 31 | 0.21 | 51 | 0.18 | 71 | 0.26 | 91 | 0.09 | 111 | 0.22 |
| 12 | 0.29 | 32 | 0.28 | 52 | 0.17 | 72 | 0.18 | 92 | 0.14 | 112 | 0.21 |
| 13 | 0.33 | 33 | 0.18 | 53 | 0.26 | 73 | 0.20 | 93 | 0.20 | 113 | 0.20 |
| 14 | 0.28 | 34 | 0.30 | 54 | 0.28 | 74 | 0.18 | 94 | 0.12 | 114 | 0.23 |
| 15 | 0.36 | 35 | 0.21 | 55 | 0.16 | 75 | 0.16 | 95 | 0.17 | 115 | 0.23 |
| 16 | 0.30 | 36 | 0.27 | 56 | 0.14 | 76 | 0.26 | 96 | 0.17 | 116 | 0.23 |
| 17 | 0.33 | 37 | 0.33 | 57 | 0.22 | 77 | 0.17 | 97 | 0.07 | 117 | 0.30 |
| 18 | 0.21 | 38 | 0.16 | 58 | 0.19 | 78 | 0.18 | 98 | 0.21 | 118 | 0.29 |
| 19 | 0.10 | 39 | 0.17 | 59 | 0.17 | 79 | 0.16 | 99 | 0.25 | 119 | 0.30 |
| 20 | 0.17 | 40 | 0.08 | 60 | 0.15 | 80 | 0.11 | 100 | 0.29 | 120 | 0.53 |

**<u>Table 7:</u> CTD dissolved oxygen calibration coefficients for cruise au0603: slope, bias, tcor ( = temperature correction term), and pcor ( = pressure correction term). dox is equal to 2.8σ , for σ as defined in the *CTD Methodology*. Note that coefficients are given for both the shallow and deep part of the profile, according to the profile split used for calibration.**

| | ---shallow--- | | | | | ---deep--- | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| stn | slope | bias | tcor | pcor | dox | slope | bias | tcor | pcor | do |
| 1 | 0.652755 | -0.416852 | 0.009799 | 0.000145 | 0.193244 | 0.497538 | -0.218103 | 0.022524 | 0.000130 | 0.027116 |
| 2 | 0.653810 | -0.429028 | 0.022044 | 0.000132 | 0.179887 | 0.794188 | -0.607257 | -0.001306 | 0.000130 | 0.013078 |
| 3 | 0.669730 | -0.476656 | 0.046578 | 0.000158 | 0.161050 | 1.670758 | -1.970783 | 0.015426 | 0.000364 | 0.043035 |
| 4 | 0.684011 | -0.507804 | 0.031222 | 0.000216 | 0.152964 | 0.474102 | -0.054474 | -0.035472 | 0.000022 | 0.040387 |
| 5 | 0.660470 | -0.458257 | 0.037197 | 0.000151 | 0.099698 | 0.200860 | 0.200178 | 0.057777 | 0.000107 | 0.040653 |
| 6 | 0.664130 | -0.453189 | 0.029405 | 0.000138 | 0.110466 | 0.703574 | -0.495252 | 0.013746 | 0.000133 | 0.022050 |
| 7 | 0.642075 | -0.403848 | 0.015855 | 0.000133 | 0.162404 | 0.489549 | -0.213434 | 0.054644 | 0.000125 | 0.042457 |
| 8 | 0.616481 | -0.356341 | 0.015693 | 0.000116 | 0.134772 | 0.495403 | -0.205919 | 0.038437 | 0.000119 | 0.066180 |
| 9 | 0.631571 | -0.398517 | 0.022234 | 0.000131 | 0.118930 | 0.193519 | 0.198422 | 0.075632 | 0.000104 | 0.058706 |
| 10 | 0.620268 | -0.359728 | 0.009063 | 0.000123 | 0.074635 | 0.801764 | -0.597336 | -0.019204 | 0.000131 | 0.028403 |
| 11 | 0.598171 | -0.315438 | 0.002013 | 0.000120 | 0.136092 | 0.500658 | -0.202125 | 0.031330 | 0.000125 | 0.028063 |
| 12 | 0.606874 | -0.342114 | 0.010893 | 0.000147 | 0.102842 | 0.500524 | -0.200491 | 0.034404 | 0.000134 | 0.011065 |
| 13 | 0.616549 | -0.334505 | 0.008346 | 0.000152 | 0.083590 | 0.602834 | -0.297027 | -0.010808 | 0.000136 | 0.029179 |
| 14 | 0.609348 | -0.309621 | 0.001007 | 0.000142 | 0.096908 | 0.547868 | -0.256211 | 0.052547 | 0.000155 | 0.050806 |
| 15 | 0.620449 | -0.330071 | 0.001473 | 0.000150 | 0.117867 | 0.603617 | -0.296561 | -0.000917 | 0.000136 | 0.016490 |
| 16 | 0.600951 | -0.287909 | -0.005711 | 0.000131 | 0.162832 | 0.602477 | -0.296491 | -0.000050 | 0.000137 | 0.010429 |
| 17 | 0.604975 | -0.298162 | -0.005566 | 0.000137 | 0.054926 | 0.603059 | -0.297845 | 0.000522 | 0.000137 | 0.012943 |
| 18 | 0.611651 | -0.310447 | -0.000605 | 0.000141 | 0.082575 | 0.548465 | -0.220194 | 0.001507 | 0.000128 | 0.065723 |
| 19 | 0.624048 | -0.338570 | 0.005064 | 0.000153 | 0.085900 | 0.603465 | -0.297339 | 0.002162 | 0.000137 | 0.027155 |
| 20 | 0.601953 | -0.291331 | -0.006036 | 0.000134 | 0.081647 | 0.604283 | -0.295594 | -0.006702 | 0.000135 | 0.016391 |
| 21 | 0.607320 | -0.303626 | -0.002029 | 0.000140 | 0.037882 | 0.571478 | -0.243383 | -0.015383 | 0.000126 | 0.017508 |
| 22 | 0.606933 | -0.302108 | -0.003926 | 0.000139 | 0.121606 | 0.679815 | -0.435171 | 0.050391 | 0.000176 | 0.034819 |
| 23 | 0.497234 | -0.129109 | -0.019167 | 0.000106 | 0.037859 | 0.553805 | -0.202877 | -0.045724 | 0.000112 | 0.015802 |
| 24 | 0.604866 | -0.296325 | -0.005579 | 0.000137 | 0.075179 | 0.551469 | -0.206584 | -0.030505 | 0.000116 | 0.015895 |
| 25 | 0.611564 | -0.303277 | -0.008937 | 0.000133 | 0.175248 | 0.603739 | -0.296462 | -0.008397 | 0.000136 | 0.016062 |
| 26 | 0.607867 | -0.305531 | -0.001651 | 0.000142 | 0.193981 | 0.603659 | -0.296155 | 0.005274 | 0.000137 | 0.016972 |
| 27 | 0.611695 | -0.305354 | -0.002364 | 0.000134 | 0.136342 | 0.604025 | -0.296690 | -0.002167 | 0.000136 | 0.019580 |
| 28 | 0.441625 | -0.040731 | -0.038812 | 0.000088 | 0.198870 | 0.596224 | -0.278708 | -0.012324 | 0.000129 | 0.047241 |
| 29 | 0.606304 | -0.298373 | -0.005789 | 0.000136 | 0.076852 | 0.604678 | -0.295820 | -0.001486 | 0.000135 | 0.012172 |
| 30 | 0.600522 | -0.292956 | -0.003656 | 0.000139 | 0.038336 | 0.482959 | -0.092064 | -0.072161 | 0.000093 | 0.033108 |
| 31 | 0.481758 | -0.100581 | -0.031258 | 0.000100 | 0.098810 | 0.605291 | -0.297417 | 0.002152 | 0.000137 | 0.031703 |
| 32 | 0.605307 | -0.305697 | 0.000708 | 0.000144 | 0.174340 | 0.603867 | -0.296606 | -0.007932 | 0.000136 | 0.013205 |
| 33 | 0.506181 | -0.141709 | -0.023420 | 0.000109 | 0.078817 | 0.603142 | -0.297267 | 0.009979 | 0.000138 | 0.013629 |
| 34 | 0.674393 | -0.418004 | 0.014412 | 0.000163 | 0.201932 | 0.556595 | -0.227713 | 0.003282 | 0.000128 | 0.044618 |
| 35 | 0.425775 | -0.008091 | -0.041782 | 0.000083 | 0.278395 | 0.600843 | -0.295747 | 0.024181 | 0.000140 | 0.033884 |
| 36 | 0.572987 | -0.250838 | -0.002823 | 0.000131 | 0.187225 | 0.604056 | -0.295987 | -0.007590 | 0.000135 | 0.013263 |
| 37 | 0.651226 | -0.380097 | 0.003912 | 0.000161 | 0.261881 | 0.590272 | -0.261340 | -0.033124 | 0.000121 | 0.020805 |
| 38 | 0.606917 | -0.304512 | -0.007528 | 0.000144 | 0.163422 | 0.565429 | -0.226094 | -0.038219 | 0.000118 | 0.022693 |
| 39 | 0.542564 | -0.199096 | -0.015979 | 0.000119 | 0.248078 | 0.597404 | -0.299401 | 0.105410 | 0.000149 | 0.019058 |
| 40 | 0.596777 | -0.290404 | -0.006295 | 0.000142 | 0.171317 | 0.603359 | -0.295104 | -0.010357 | 0.000136 | 0.024746 |
| 41 | 0.523074 | -0.157965 | -0.018801 | 0.000100 | 0.101439 | 0.523074 | -0.157965 | -0.018801 | 0.000100 | 0.101439 |
| 42 | 0.753569 | -0.565740 | 0.030918 | 0.000250 | 0.244201 | 0.753569 | -0.565740 | 0.030918 | 0.000250 | 0.244201 |
| 43 | - | - | - | - | - | - | - | - | - | - |
| 44 | 0.297723 | 0.666462 | 0.207927 | 0.000013 | 0.064569 | 0.297723 | 0.666462 | 0.207927 | 0.000013 | 0.064569 |
| 45 | 0.591743 | -0.289417 | 0.001884 | 0.000142 | 0.107771 | 0.566507 | -0.240407 | -0.018413 | 0.000126 | 0.022519 |
| 46 | 0.515432 | -0.155865 | -0.020066 | 0.000106 | 0.132540 | 0.689684 | -0.480881 | 0.123670 | 0.000204 | 0.054072 |
| 47 | 0.612795 | -0.321984 | 0.001446 | 0.000148 | 0.160034 | 0.601484 | -0.297538 | -0.003295 | 0.000137 | 0.009715 |
| 48 | 0.596912 | -0.299352 | 0.001393 | 0.000145 | 0.094305 | 0.604663 | -0.296480 | -0.014746 | 0.000134 | 0.019194 |
| 49 | 0.563741 | -0.249019 | 0.000657 | 0.000137 | 0.114220 | 0.685792 | -0.446500 | 0.054654 | 0.000177 | 0.019897 |
| 50 | 0.600806 | -0.294675 | -0.006552 | 0.000135 | 0.157640 | 0.601274 | -0.297353 | -0.001412 | 0.000137 | 0.016019 |
| 51 | 0.598651 | -0.297996 | -0.000556 | 0.000141 | 0.038654 | 0.601152 | -0.297928 | -0.006161 | 0.000138 | 0.024874 |
| 52 | 0.577671 | -0.264776 | -0.011079 | 0.000138 | 0.187041 | 0.594936 | -0.301189 | 0.025205 | 0.000147 | 0.054034 |
| 53 | 0.610524 | -0.325717 | -0.002052 | 0.000160 | 0.210539 | 0.601831 | -0.297796 | -0.009560 | 0.000137 | 0.007939 |
| 54 | 0.603678 | -0.307178 | -0.004542 | 0.000147 | 0.132689 | 0.299889 | 0.099303 | 0.097307 | 0.000131 | 0.009856 |
| 55 | 0.596082 | -0.294671 | -0.003413 | 0.000143 | 0.145980 | 0.903046 | -0.696019 | -0.057099 | 0.000139 | 0.006375 |
| 56 | 0.598722 | -0.285248 | 0.002495 | 0.000116 | 0.177874 | 0.598722 | -0.285248 | 0.002495 | 0.000116 | 0.177874 |
| 57 | 0.566481 | -0.229158 | -0.003994 | 0.000070 | 0.185430 | 0.566481 | -0.229158 | -0.003994 | 0.000070 | 0.185430 |
| 58 | 0.573139 | -0.205219 | 0.021613 | 0.000098 | 0.128024 | 0.573139 | -0.205219 | 0.021613 | 0.000098 | 0.128024 |
| 59 | 0.647191 | -0.463655 | -0.047252 | 0.000269 | 0.059516 | 0.647191 | -0.463655 | -0.047252 | 0.000269 | 0.059516 |
| 60 | 0.603196 | -0.293128 | -0.007540 | 0.000132 | 0.111865 | 0.602583 | -0.296691 | -0.005734 | 0.000136 | 0.014881 |
| 61 | 0.599644 | -0.299499 | 0.000837 | 0.000140 | 0.099733 | 0.599803 | -0.298521 | -0.002396 | 0.000139 | 0.012022 |
| 62 | 0.583824 | -0.247515 | -0.027634 | 0.000112 | 0.035156 | 0.604178 | -0.297368 | -0.009886 | 0.000134 | 0.055011 |
| 63 | 0.622449 | -0.352013 | 0.024063 | 0.000163 | 0.184615 | 0.599301 | -0.298173 | 0.003797 | 0.000140 | 0.030850 |
| 64 | 0.604973 | -0.307364 | -0.003781 | 0.000145 | 0.105261 | 0.601857 | -0.297417 | -0.013183 | 0.000136 | 0.020213 |
| 65 | 0.602963 | -0.301313 | -0.005471 | 0.000143 | 0.113575 | 0.455733 | -0.056124 | -0.143921 | 0.000082 | 0.013079 |
| 66 | 0.600203 | -0.297123 | -0.007865 | 0.000139 | 0.143704 | 0.490932 | -0.108626 | -0.143385 | 0.000087 | 0.009735 |

**Table 7: (continued)**

| | shallow | | | | | deep | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| stn | slope | bias | tcor | pcor | dox | slope | bias | tcor | pcor | do |
| 67 | 0.605310 | -0.304206 | -0.009937 | 0.000138 | 0.118820 | 0.370663 | 0.102580 | -0.307390 | 0.000035 | 0.019258 |
| 68 | 0.697366 | -0.506755 | -0.011861 | 0.000260 | 0.102049 | 0.697366 | -0.506755 | -0.011861 | 0.000260 | 0.102049 |
| 69 | 0.375713 | 0.190276 | 0.026137 | 0.000003 | 0.092151 | 0.375713 | 0.190276 | 0.026137 | 0.000003 | 0.092151 |
| 70 | 0.303615 | 0.363771 | 0.052605 | 0.000015 | 0.065590 | 0.303615 | 0.363771 | 0.052605 | 0.000015 | 0.065590 |
| 71 | 0.508509 | -0.085413 | 0.009181 | 0.000058 | 0.050672 | 0.508509 | -0.085413 | 0.009181 | 0.000058 | 0.050672 |
| 72 | 0.605223 | -0.304944 | -0.006197 | 0.000143 | 0.132656 | 0.687225 | -0.449278 | 0.043325 | 0.000177 | 0.034410 |
| 73 | 0.599973 | -0.304178 | -0.005388 | 0.000147 | 0.105875 | 0.607212 | -0.294662 | -0.030051 | 0.000133 | 0.050940 |
| 74 | 0.618572 | -0.352913 | 0.022386 | 0.000165 | 0.024913 | 0.599063 | -0.300304 | -0.001880 | 0.000139 | 0.016806 |
| 75 | 0.618511 | -0.346235 | 0.011201 | 0.000160 | 0.105645 | 0.596940 | -0.303263 | 0.005534 | 0.000143 | 0.027972 |
| 76 | 0.620842 | -0.349926 | 0.012375 | 0.000167 | 0.175265 | 0.598596 | -0.299286 | 0.007775 | 0.000141 | 0.035382 |
| 77 | 0.597980 | -0.298170 | 0.003350 | 0.000140 | 0.100016 | 0.629859 | -0.338363 | -0.000071 | 0.000142 | 0.035386 |
| 78 | 0.588936 | -0.281352 | -0.004631 | 0.000137 | 0.159051 | 0.602466 | -0.298390 | -0.007297 | 0.000136 | 0.009556 |
| 79 | 0.588599 | -0.272385 | -0.001915 | 0.000120 | 0.132707 | 0.450622 | -0.065108 | -0.068371 | 0.000103 | 0.105367 |
| 80 | 0.604353 | -0.310046 | -0.000709 | 0.000147 | 0.158210 | 0.553485 | -0.216431 | -0.008198 | 0.000120 | 0.017316 |
| 81 | 0.570763 | -0.247056 | -0.004529 | 0.000128 | 0.137514 | 0.570763 | -0.247056 | -0.004529 | 0.000128 | 0.137514 |
| 82 | 0.511558 | -0.096292 | 0.005107 | 0.000023 | 0.227326 | 0.511558 | -0.096292 | 0.005107 | 0.000023 | 0.227326 |
| 83 | 0.510396 | -0.072678 | 0.027873 | 0.000085 | 0.068433 | 0.510396 | -0.072678 | 0.027873 | 0.000085 | 0.068433 |
| 84 | 0.570697 | -0.230352 | -0.002830 | 0.000108 | 0.124031 | 0.570697 | -0.230352 | -0.002830 | 0.000108 | 0.124031 |
| 85 | 0.547824 | -0.183512 | 0.004795 | 0.000117 | 0.064202 | 0.547824 | -0.183512 | 0.004795 | 0.000117 | 0.064202 |
| 86 | 0.591769 | -0.286439 | -0.002960 | 0.000131 | 0.129514 | 0.599868 | -0.299521 | -0.009938 | 0.000137 | 0.012667 |
| 87 | 0.625004 | -0.356896 | 0.008294 | 0.000168 | 0.160091 | 0.603100 | -0.296711 | -0.007172 | 0.000135 | 0.010458 |
| 88 | 0.601416 | -0.306277 | 0.004289 | 0.000142 | 0.114731 | 0.601677 | -0.297657 | -0.004480 | 0.000137 | 0.015879 |
| 89 | 0.602600 | -0.310617 | 0.005244 | 0.000148 | 0.101107 | 0.601707 | -0.297947 | -0.007258 | 0.000136 | 0.007543 |
| 90 | 0.607763 | -0.314725 | 0.000526 | 0.000148 | 0.097458 | 0.602825 | -0.297146 | -0.007817 | 0.000135 | 0.007344 |
| 91 | 0.586840 | -0.268034 | -0.003737 | 0.000121 | 0.174229 | 0.601409 | -0.298020 | 0.004027 | 0.000137 | 0.005347 |
| 92 | 0.597519 | -0.293590 | -0.004623 | 0.000139 | 0.093166 | 0.604054 | -0.295883 | -0.015066 | 0.000132 | 0.014515 |
| 93 | 0.599533 | -0.297223 | -0.009178 | 0.000141 | 0.165715 | 0.946965 | -0.859477 | 0.084971 | 0.000265 | 0.004955 |
| 94 | 0.597052 | -0.290942 | 0.004882 | 0.000134 | 0.108387 | 0.603024 | -0.296559 | -0.009702 | 0.000134 | 0.031953 |
| 95 | 0.612679 | -0.321346 | -0.003832 | 0.000149 | 0.113507 | 0.574600 | -0.136006 | -0.175431 | 0.000021 | 0.027745 |
| 96 | 0.605893 | -0.308061 | -0.006174 | 0.000143 | 0.054024 | 0.288212 | 0.267549 | -0.140394 | 0.000001 | 0.016164 |
| 97 | 1.454430 | -2.126514 | -0.153056 | 0.000784 | 0.121560 | - | - | - | - | - |
| 98 | 0.546056 | -0.185231 | -0.001644 | 0.000053 | 0.172478 | 0.546056 | -0.185231 | -0.001644 | 0.000053 | 0.172478 |
| 99 | 0.572271 | -0.248816 | -0.000119 | 0.000208 | 0.165633 | 0.572271 | -0.248816 | -0.000119 | 0.000208 | 0.165633 |
| 100 | 0.517196 | 0.001072 | 0.079250 | 0.000165 | 0.101136 | 0.517196 | 0.001072 | 0.079250 | 0.000165 | 0.101136 |
| 101 | 0.625130 | -0.246245 | 0.063866 | 0.000166 | 0.118148 | 0.625130 | -0.246245 | 0.063866 | 0.000166 | 0.118148 |
| 102 | 0.555191 | -0.211816 | -0.004539 | 0.000134 | 0.085224 | 0.555191 | -0.211816 | -0.004539 | 0.000134 | 0.085224 |
| 103 | 0.592115 | -0.283174 | -0.010276 | 0.000129 | 0.125568 | 0.602435 | -0.298428 | -0.011751 | 0.000131 | 0.031424 |
| 104 | 0.614509 | -0.350635 | 0.014669 | 0.000165 | 0.187176 | 1.125279 | -1.049072 | -0.058620 | 0.000244 | 0.004938 |
| 105 | 0.604459 | -0.318983 | -0.000385 | 0.000148 | 0.121836 | 0.602151 | -0.298807 | -0.007945 | 0.000130 | 0.024139 |
| 106 | 0.596318 | -0.324288 | 0.021392 | 0.000150 | 0.140398 | 0.596474 | -0.303039 | -0.003484 | 0.000140 | 0.010927 |
| 107 | 0.587203 | -0.277545 | -0.009392 | 0.000129 | 0.096931 | 0.597193 | -0.302668 | -0.001083 | 0.000141 | 0.013531 |
| 108 | 0.595608 | -0.304058 | 0.004371 | 0.000147 | 0.075133 | 0.601981 | -0.298302 | -0.012235 | 0.000135 | 0.009206 |
| 109 | 0.600617 | -0.307316 | -0.002693 | 0.000145 | 0.169045 | 0.600348 | -0.299597 | -0.009992 | 0.000137 | 0.014380 |
| 110 | 0.597901 | -0.299653 | -0.001489 | 0.000140 | 0.114600 | 0.601728 | -0.298972 | -0.009008 | 0.000135 | 0.029764 |
| 111 | 0.591275 | -0.286424 | -0.000584 | 0.000135 | 0.188512 | 0.599104 | -0.300809 | -0.000619 | 0.000139 | 0.015369 |
| 112 | 0.586880 | -0.277070 | -0.006406 | 0.000132 | 0.098578 | 0.955418 | -1.100285 | 0.491995 | 0.000703 | 0.013512 |
| 113 | 0.603500 | -0.303530 | -0.000368 | 0.000135 | 0.120229 | 0.601896 | -0.297967 | -0.007119 | 0.000134 | 0.004760 |
| 114 | 0.600480 | -0.303178 | -0.004469 | 0.000138 | 0.148337 | 0.394864 | -0.007404 | 0.009988 | 0.000115 | 0.017344 |
| 115 | 0.594421 | -0.293862 | -0.005063 | 0.000146 | 0.133443 | 0.594421 | -0.293862 | -0.005063 | 0.000146 | 0.133443 |
| 116 | 0.600301 | -0.302078 | -0.010212 | 0.000122 | 0.137565 | 0.600301 | -0.302078 | -0.010212 | 0.000122 | 0.137565 |
| 117 | 0.720728 | -0.679434 | -0.099457 | 0.000341 | 0.114207 | 0.720728 | -0.679434 | -0.099457 | 0.000341 | 0.114207 |
| 118 | 0.496520 | -0.122527 | -0.031029 | 0.000036 | 0.119947 | 0.496520 | -0.122527 | -0.031029 | 0.000036 | 0.119947 |
| 119 | - | - | - | - | - | - | - | - | - | - |
| 120 | - | - | - | - | - | - | - | - | - | - |

**Table 8: Suspect dissolved oxygen bottle values (not deleted from bottle data file).**

| station number | rosette position |
|---|---|
| 3 | 6 |
| 28 | 3 |
| 85 | 11 |
| 116 | 10, 12 |

**Table 9:** **Suspect CTD 2 dbar averages (not deleted from the CTD 2dbar average files) for the indicated parameters: T=temperature; S=salinity and conductivity; O=oxygen; F=fluorsecence.**

| station number | questionable 2 dbar value(dbar) | parameters |
|---|---|---|
| 23 | 2-28 | O |
| 31 | 2-18 | O |
| 39 | 2-20 | O |
| 41 | 2-18 | O |
| 42 | 2-18 | O |
| 62 | 34-64 | O |
| 73 | 50-56 | O |
| 83 | 2-12 | O |
| 97 | 38-62 | O |
| 101 | 2-18 | O |
| 102 | 2-24 | O |
| 115 | 2-16 | O |
| 117 | 2-20 | O |

**Table 10:** **Suspect nutrient sample values (not deleted from bottle data file) for cruise au0603.**

| PHOSPHATE | | NITRATE | | SILICATE | |
|---|---|---|---|---|---|
| station number | rosette position | station number | rosette position | station number | rosette position |
| 5 | 5 | 5 | 5 | | |
| | | | | 6 | 9,14 |
| 7 | 4 | | | 7 | 4 |
| 9 | 3 | | | 9 | 3 |
| | | | | 11 | 2 |
| | | | | 13 | 16 |
| | | 15 | 19,20,21 | | |
| | | 19 | 21,24 | 19 | 15 |
| 22 | 5 | 22 | 5 | 22 | 5 |
| 26 | 5 | 26 | 5 | 26 | 5 |
| 28 | 21 | | | | |
| 30 | 5 | | | | |
| | | | | 34 | 5 |
| | | | | 41 | 7 |
| | | | | 45 | 12 |
| | | 46 | whole stn | 46 | 15 |
| 47 | 14 | 47 | 14 | 47 | 14 |
| 50 | 8 | | | | |
| 52 | 20 | | | | |
| 65 | 8,11 | | | | |
| 73 | 10 | | | 73 | 10 |
| | | 82 | whole stn | | |
| | | 83 | whole stn | | |
| | | 84 | whole stn | | |
| | | 85 | whole stn | | |
| | | 86 | whole stn | | |
| 108 | 4,6 | 108 | 7 | 108 | 4 |
| 110 | 20 | 110 | 21 | | |

**Table 11:** **ADCP logging and calibration parameters for cruise au0603.**

| *ping parameters* | | *bottom track ping parameters* | |
|---|---|---|---|
| no. of bins: | 60 | no. of bins: | 128 |
| bin length: | 8 m | bin length: | 4 m |
| pulse length: | 8 m | pulse length: | 32 m |
| delay: | 4 m | | |
| ping interval: | minimum | ping interval: | same as profiling pings |

| | |
|---|---|
| reference layer averaging: | bins 8 to 20 |
| XROT: | 822 |
| ensemble averaging duration: | 3 min. (for logged data) |
| | 30 min. (for final processed data) |

*calibration*

| $\alpha$ (± standard deviation) | $1+\beta$ (± standard deviation) | no. of calibration sites |
|---|---|---|
| 2.436 ± 0.525 | 1.0509 ± 0.010 | 229 |

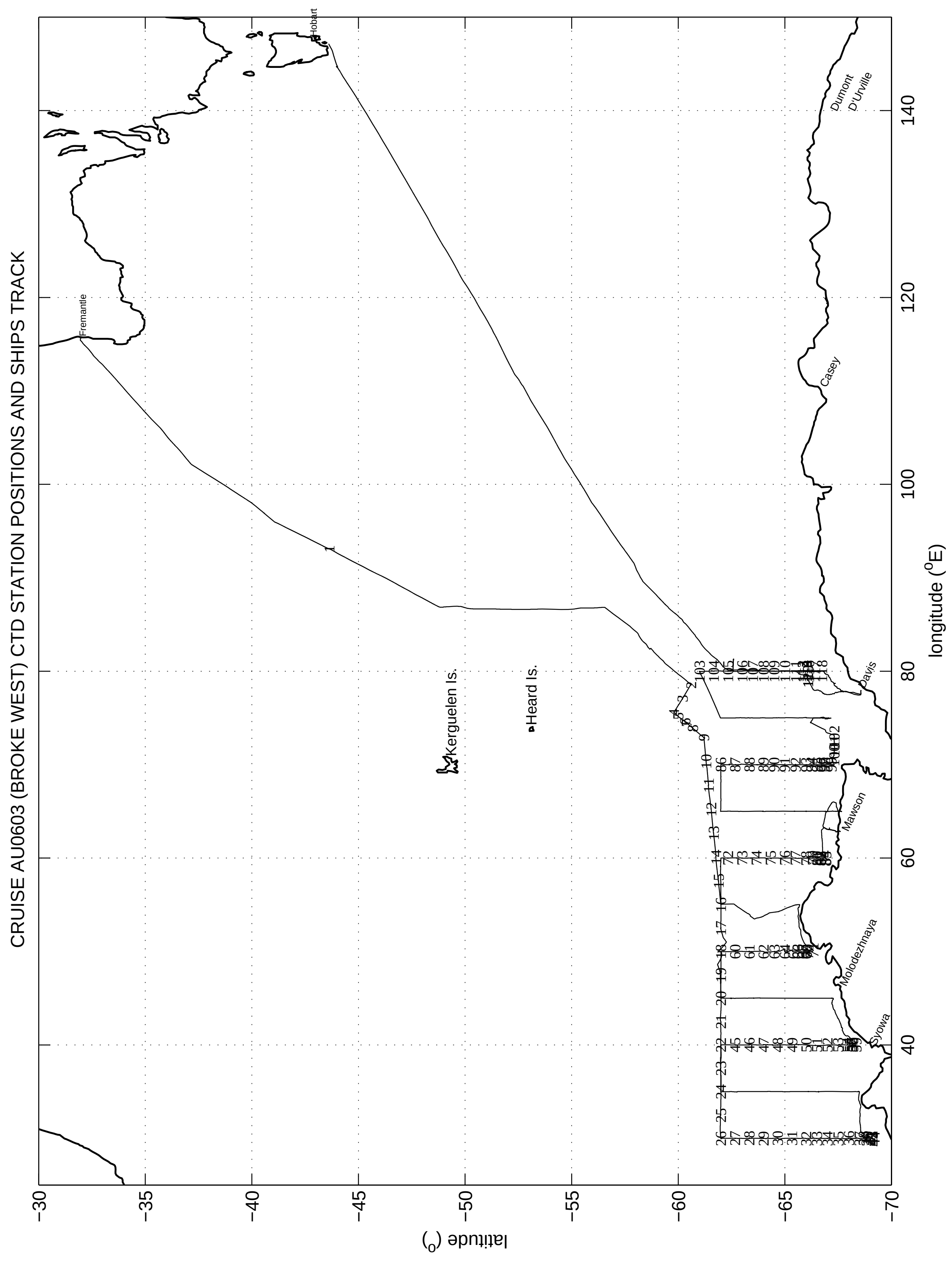



**Figure 1a:** **CTD station positions and ship's track for cruise au0603.**

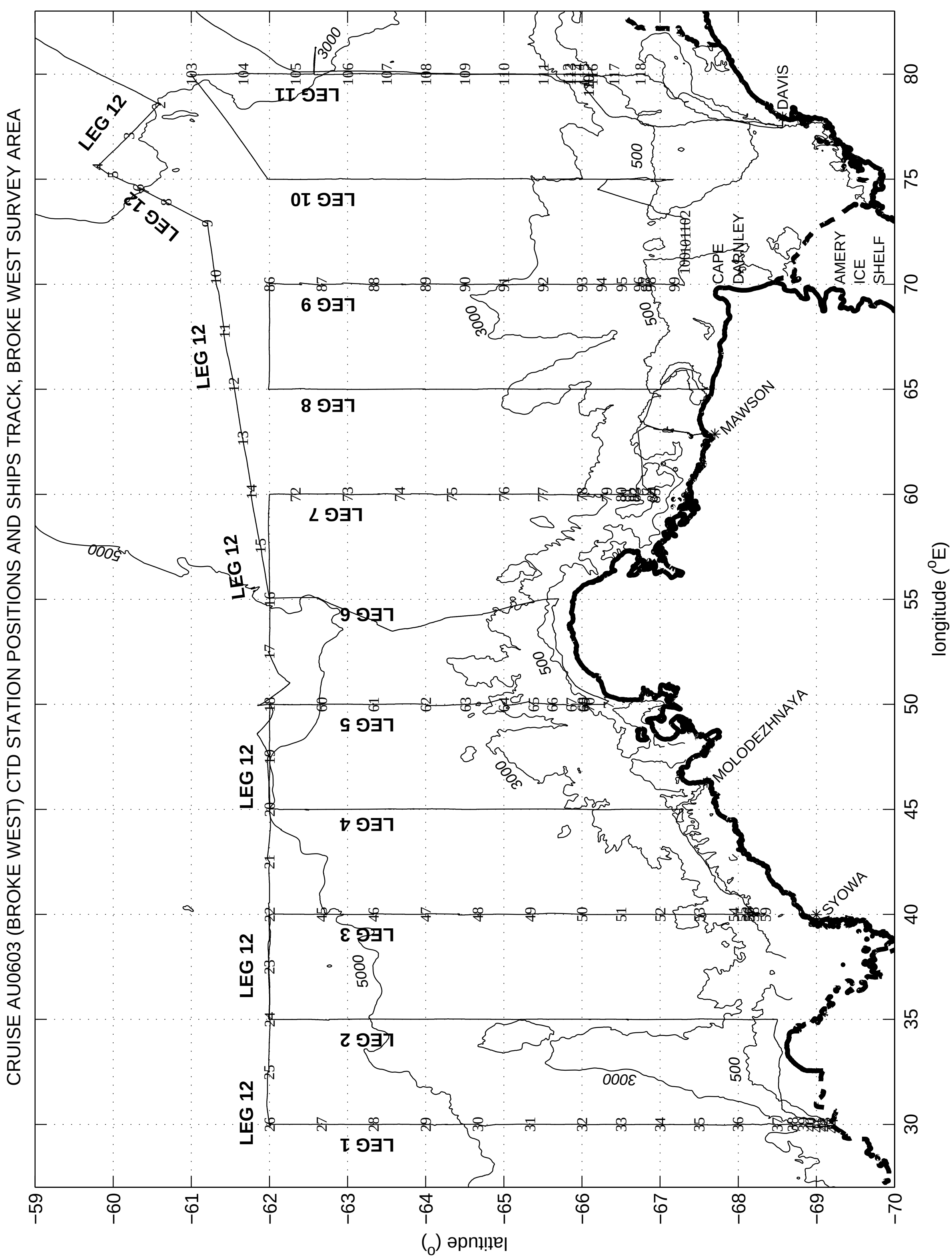
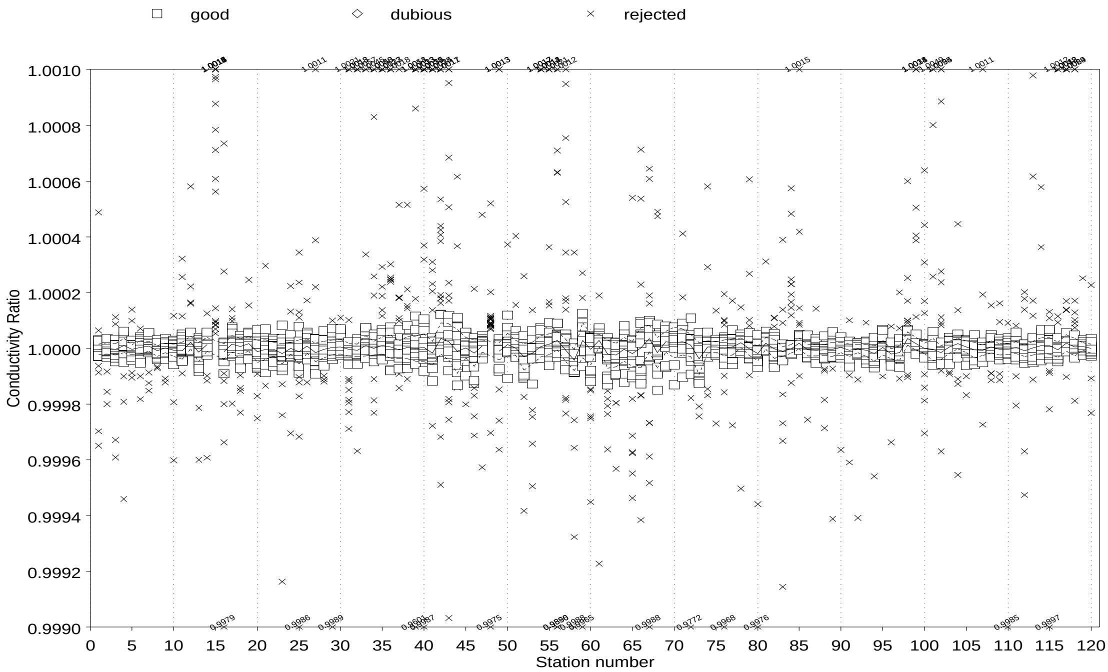



**Figure 1b:** **CTD station positions and ship's track for cruise au0603, BROKE West survey area, including depth contours from GEBCO2003 bathymetry.**



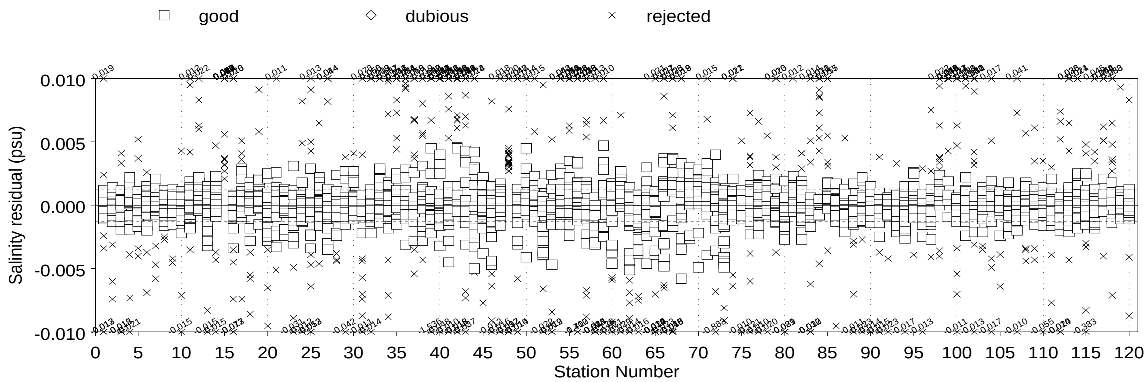

Calibration data for cruise : au0603

Calibration file : a0603.bot

Conductivity s.d. = 0.00003

Number of bottles used = 1990 out of 2505 Mean ratio for all bottles = 1.00000

**Figure 2:** **Conductivity ratio $c_{btl}/c_{cal}$ versus station number for cruise au0603. The solid line follows the mean of the residuals for each station; the broken lines are ± the standard deviation of the residuals for each station. $c_{cal}$ = calibrated CTD conductivity from the CTD upcast burst data; $c_{btl}$ = 'in situ' Niskin bottle conductivity, found by using CTD pressure and temperature from the CTD upcast burst data in the conversion of Niskin bottle salinity to conductivity.**




Calibration data for cruise : au0603

Calibration file : a0603.bot

Mean offset salinity = 0.0000psu (s.d. = 0.0013 psu)

Number of bottles used = 1990 out of 2505

**Figure 3:** **Salinity residual ($s_{btl}$ - $s_{cal}$) versus station number for cruise au0603. The solid line is the mean of all the residuals; the broken lines are ± the standard deviation of all the residuals. $s_{cal}$ = calibrated CTD salinity; $s_{btl}$ = Niskin bottle salinity value.**

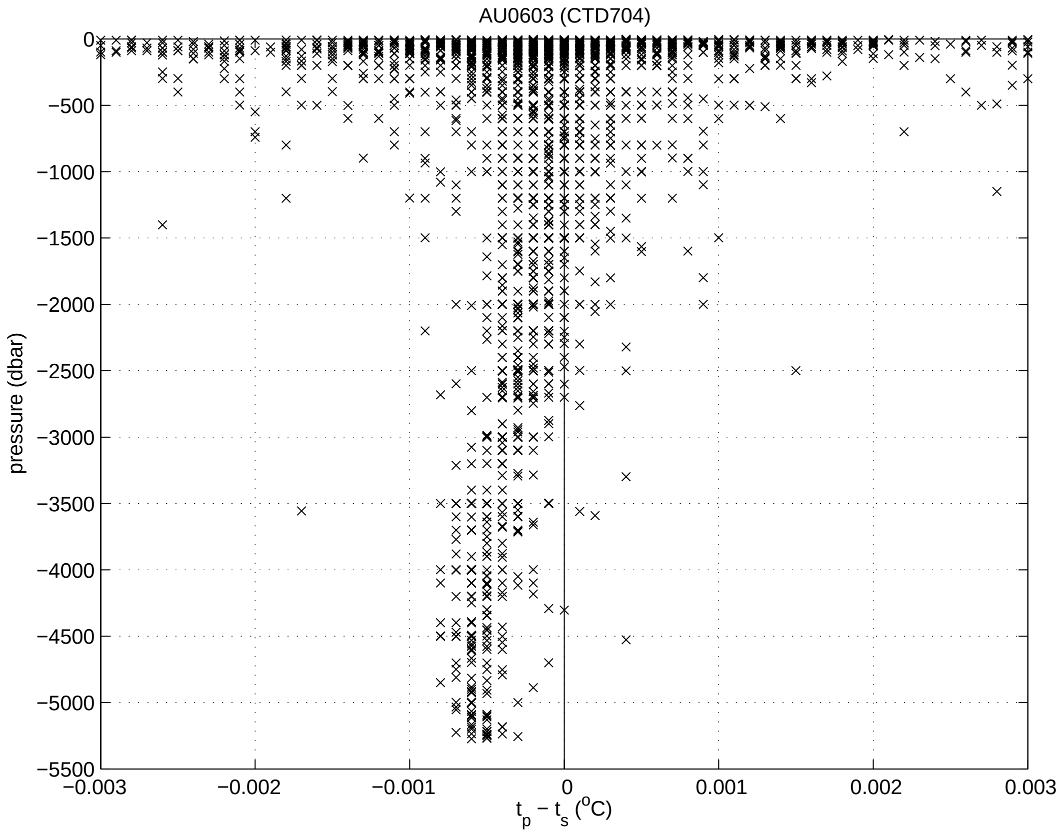



**Figure 4:** **Difference between primary and secondary temperature sensor ($t_p$ - $t_s$) for CTD upcast burst data from Niskin bottle stops, for cruise au0603.**

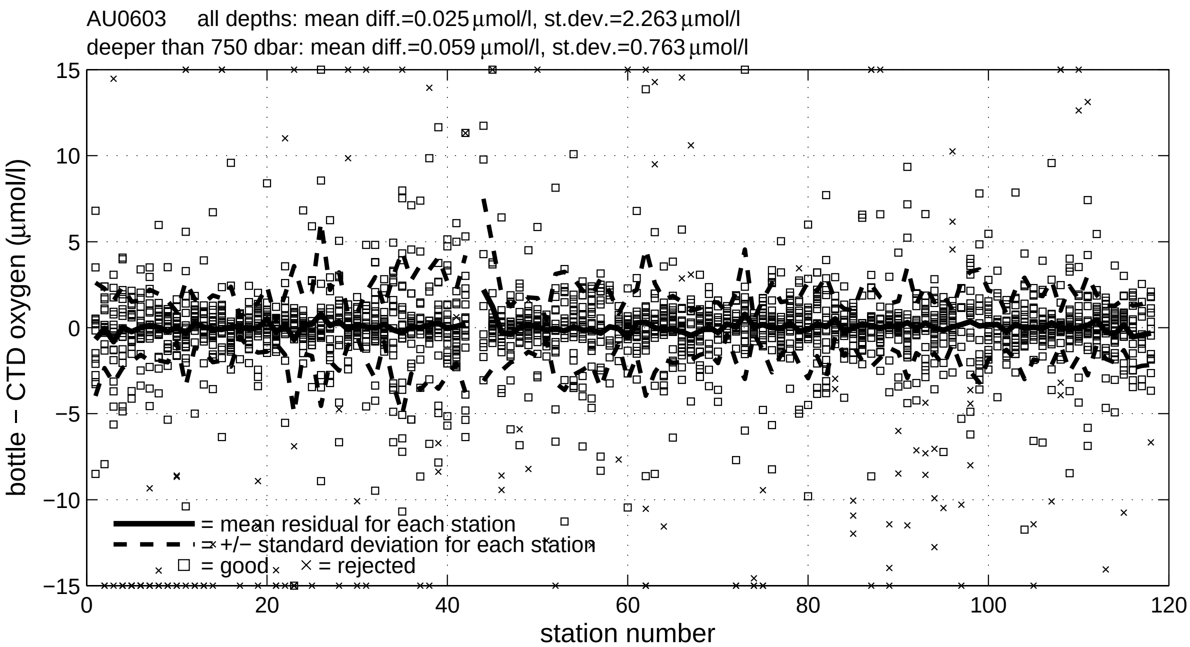
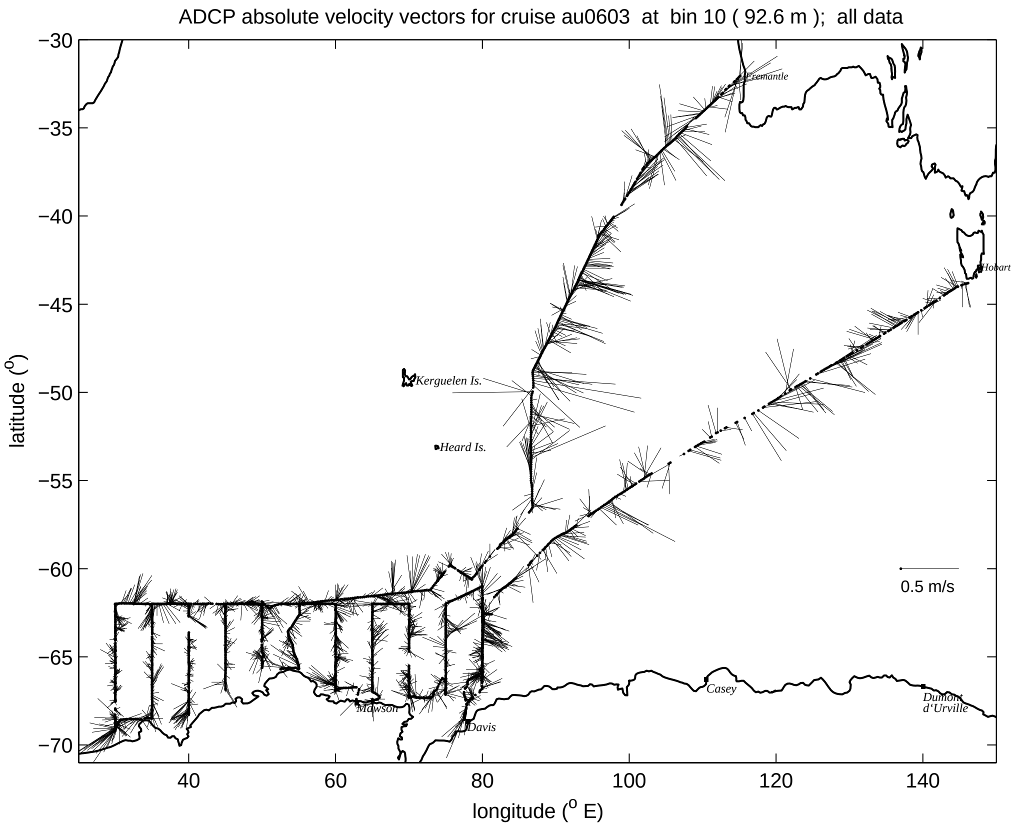
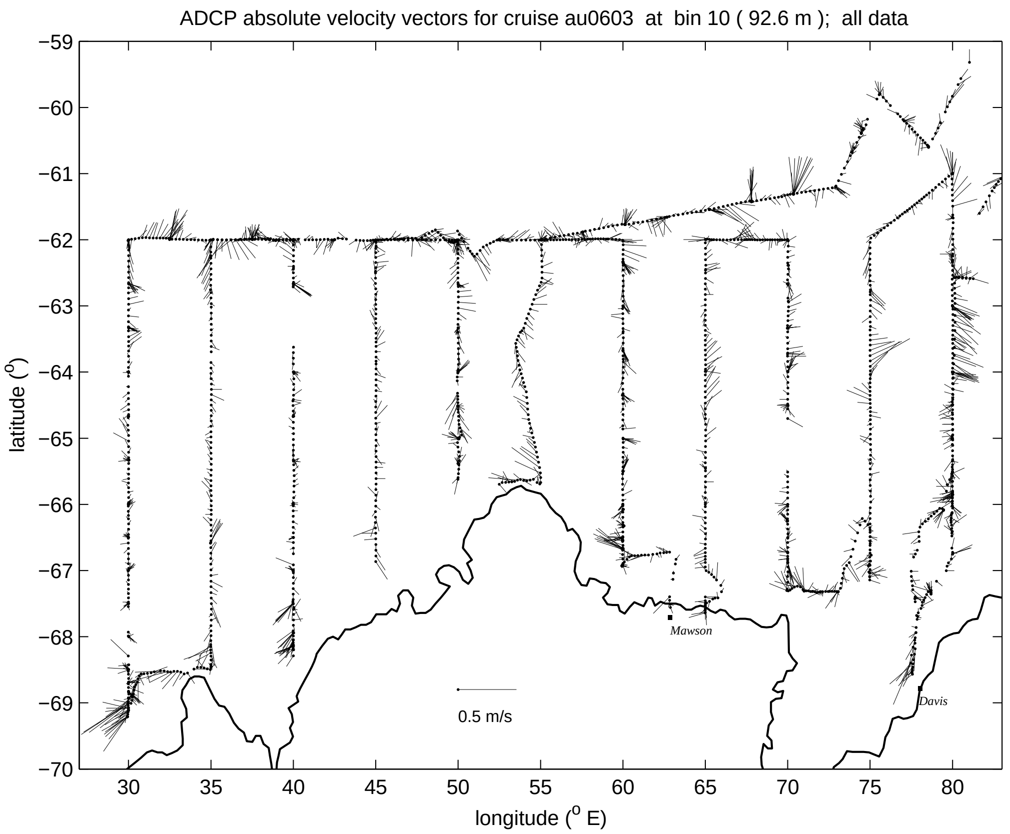



**Figure 5:** **Dissolved oxygen residual ($o_{btl}$ - $o_{cal}$) versus station number for cruise au0603. The solid line follows the mean residual for each station; the broken lines are ± the standard deviation of the residuals for each station. $o_{cal}$=calibrated downcast CTD dissolved oxygen; $o_{btl}$=Niskin bottle dissolved oxygen value. Note: values outside vertical axes are plotted on axes limits.**

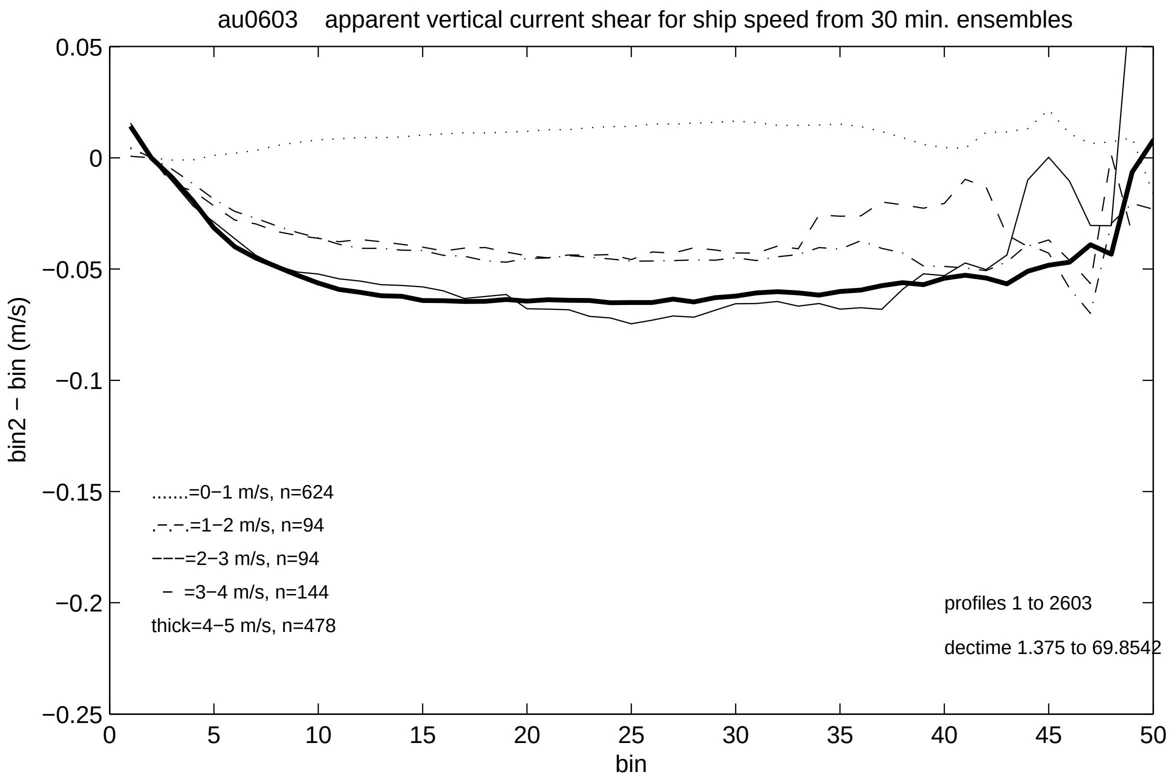
**(a)**

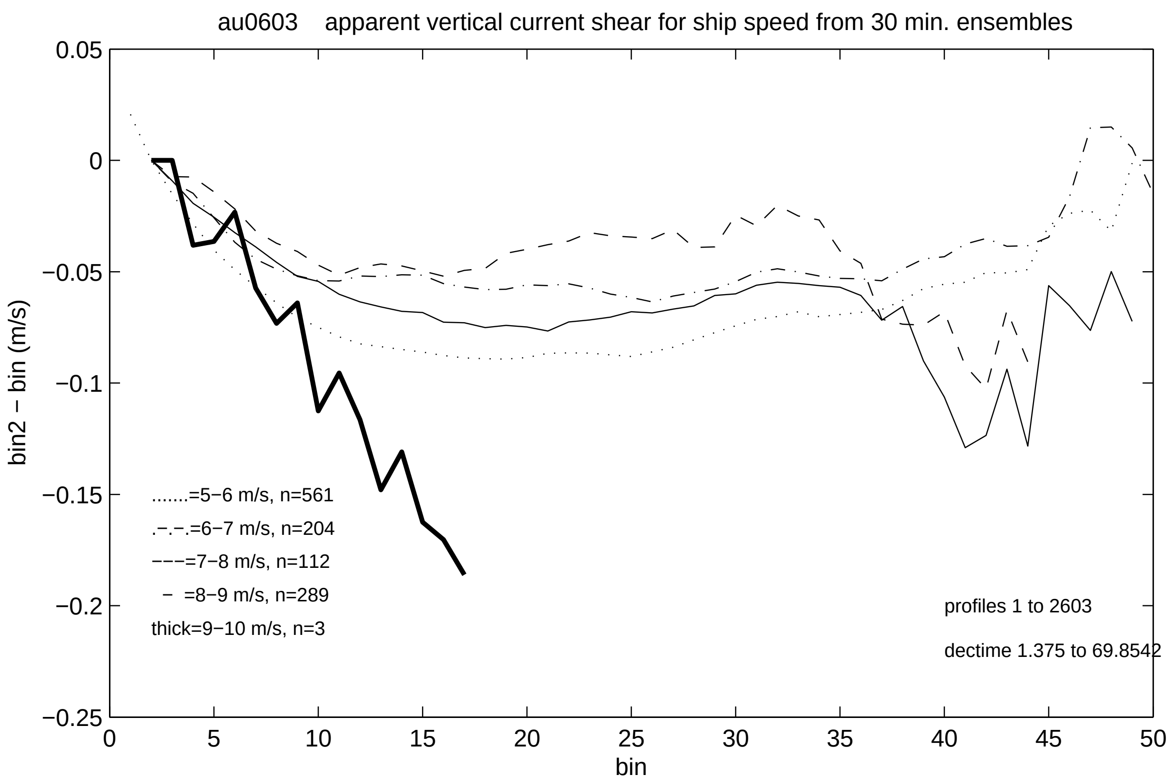



**(b)**



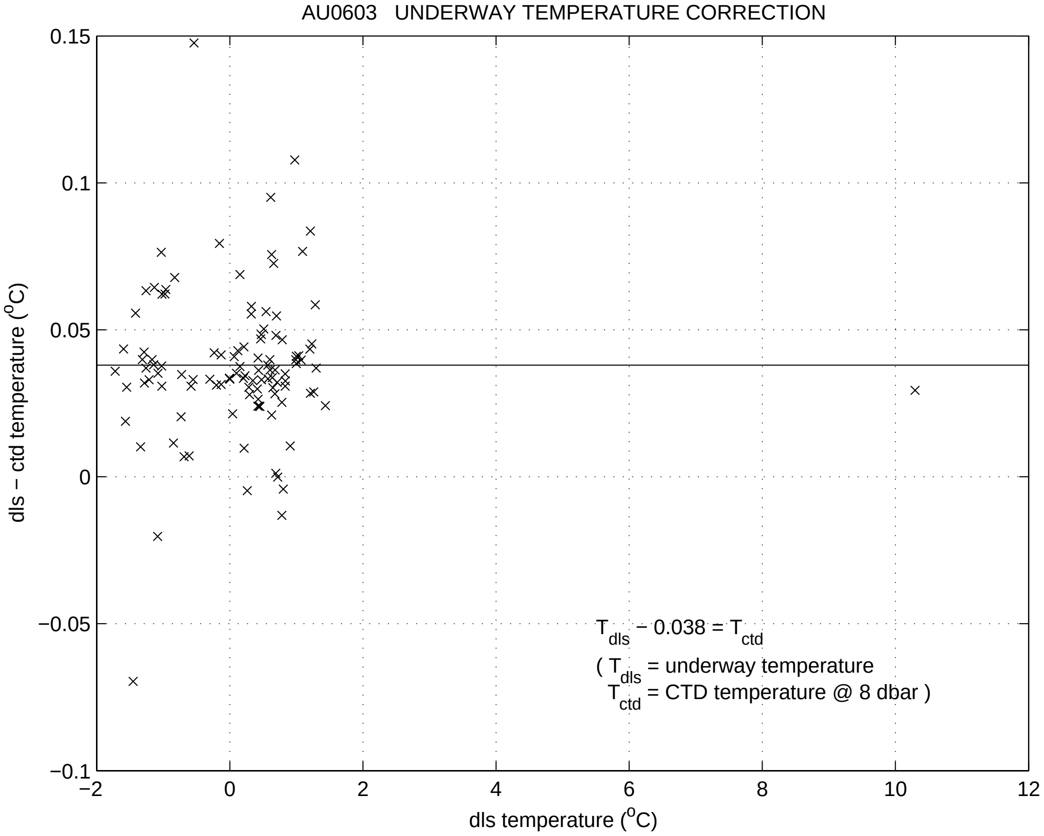

**<u>Figure 6a and b:</u> au0603 hull mounted ADCP 30 minute ensemble data, for (a) whole cruise track, and (b) BROKE West survey area.**




**<u>Figure 7:</u> au0603 apparent ADCP vertical current shear, calculated from uncorrected (i.e. ship speed included) ADCP velocities. The data are divided into different speed classes, according to ship speed during the 30 minute ensembles. For each speed class, the profile is an average over the entire cruise.**

(a)




(b)

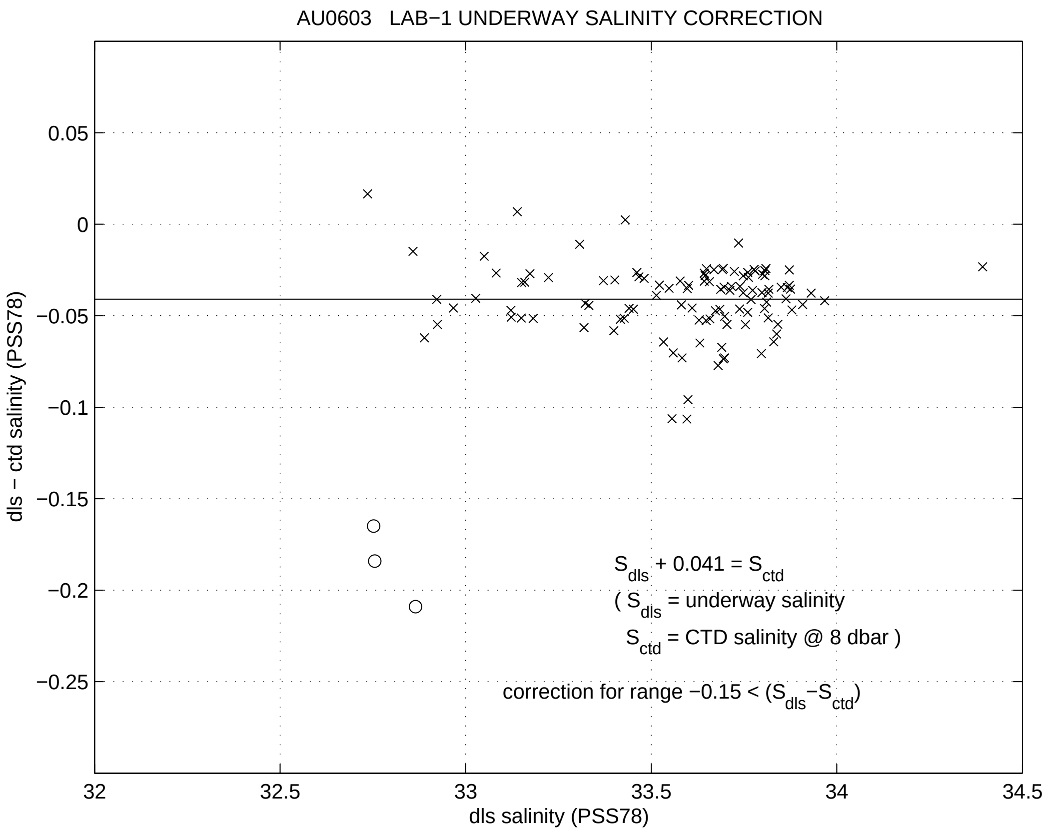



**Figure 8a and b: au0603 comparison between (a) CTD and underway temperature data (i.e. hull mounted temperature sensor), and (b) CTD and underway salinity data (i.e. Tilbrook's lab 1 SeaBird), including bestfit lines. Note: dls refers to underway data.**