## CTD Stations

### 4.1 CTD and rosette technical report — Dave Teare


Two CTDs systems were used during the cruise. One of standard stainless steel construction, with aluminium, titanium and plastic instrument housings, used for physics and biology sampling. The second, of titanium and plastic construction, used for iron sampling. The instrument suits were basically very similar, consisting of Seabird 9+ CTDs with dual C/T sensors and oxygen. Auxiliary sensors were Chelsea Instruments transmissometer and fluorometer and Seatech light backscatter sensor.

Additional instruments on the stainless steel unit included an RDI 300kHz workhorse lowered ADCP, for all casts, and the occasional fitting of a PML par light sensor. Also the secondary T/C sensors and an experimental oxygen sensor were fitted to the stabilising vane, to remove the effects of water entrainment within the CTD package. The occasional sock and polystyrene cup were fitted for deep water compressibility tests.

In general both systems worked well, with two notable exceptions. Both altimeters were poor at bottom detection, this is an ongoing problem which sometimes results in a little sediment sampling(!), due to low power out, bottom type and package orientation. The old IOS 10kHz pinger is fitted as standard back up to cater for this.

The second problem was with the stainless system fluorometer, which had a persistent depth related noise problem around 80 to 200 metres. Sensor, cable and data channel changes failed to cure the fault. There appeared to be no correlation between this and other instrument operation. This problem was still unresolved at the end of D285.

The LADCP worked without problem, except for one instance when it ‘hung up’ after a cast. This was simply cured by disconnecting power for a short period.

**Table 4.1a CTD sensors and serial numbers at start of D285**

| | Titanium | Stainless steel |
|---|---|---|
| Primary temp | 4381 | 4105 |
| Primary cond | 2851 | 2571 |
| Pressure | 90074 | 83008 |
| Secondary temp | 4380 | 4151 |
| Secondary cond | 2858 | 2580 |
| Oxygen (SBE 43 | 0363 | 0621 |
| Altimeter (Benthos-916) | 1037 | 1040 |
| Fluorometer (Chelsea mk3) | 163 | 160 |
| Transmissometer (Alpha traka) | 161047 | 161048 |
| Light back scatter | 338 | 346 |
| P.A.R (PML) | not fitted | RVS01 |
| R.D.I.(WH300 in lowered mode) | not fitted | 4726 |

**Table 4.1b Sensor and configuration changes during D285**

| | |
|---|---|
| Titanium | No changes. |
| Stainless | The transmissometer was changed prior to 15489s |
| | The fluorometer was changed prior to 15523s |
| | The P.A.R. was changed prior to 15523s |
| | The fluorometer channel was changed prior to 15540s. |

All calibrations, sensor numbers and CTD configurations are held in the Seabird ******.CON files associated with each cast.

**CTD technical update for D286** **Jon Short**

For the second leg of the Crozex cruises (D286) the only change to either frame was the substitution of the LSS with a WetLabs BBRTD s/n 167. The fluorometer problem was investigated but again no cause was found, however it was discovered that the altimeter connector had leaked due to being badly fitted onto the CTD breakout box. This connector, along with the BBRTD connector which had also leaked, was replaced at the end of the cruise.

## 4.2 Salinometry

**John Allen, Paul Duncan, Alan Hughes, Dougal Mountifield, Hugh Venables**

A Guildline Autosal salinometer (model 8400B, serial no. 65764) was installed in the stable laboratory. This salinometer had been serviced by OSIL just before the AMT cruise, D284. The stable laboratory rather than the constant temperature (CT) laboratory, was used because the latter was required for biological incubation experiments at temperatures below the operating range of the salinometer. The chemistry laboratory was also fully occupied with carbon chemistry apparatus. Not having access to controlled environmental conditions is a problem for salinometry. According to the manual, the 8400B can operate successfully at lab temperatures between 4°C below and 2°C above the bath temperature, the preferred temperature being in the middle of this range. The bath temperature was set at 21°C for the majority of this cruise, however, salinity crates processed at the beginning and end of the cruise were an exception, where rising temperature in the CT lab forced the selection of a bath temperature of 24°C. A

thermometer was used to measure the temperature of the stable lab., which varied slowly between 18.5 and 22°C throughout the cruise.

This was the first cruise during which we used OSIL's Autosal software, SoftSal, throughout. On a multidisciplinary cruise like D285, this expedites the entry of determined salinities into excel spreadsheets for merging with instrument data files. The software and the Autosal worked well and the stability of measurements, determined by monitoring the standard deviation of salinity measurements, was good. With few exceptions, the bottle samples were determined to a precision greater than 0.001. S.D. is plotted against sample number in Fig. 4.1, for the underway bottle samples; interestingly the precision seems to improve with time. There are a couple of points worth noting about using this software however; firstly the software encourages the operator to re-trim the salinometer after each standardisation to standard seawater. This is almost certainly because, and the second point to note is, the measured salinity standard is not recorded in the output file, so no post measurement offset can be made. OSIL's latest software (advertised in the standard seawater boxes), looks as though it overcomes this limitation, furthermore it is designed to be directly compatible with spreadsheet software like MS Excel.

Salinity values were copied in to an Excel spreadsheet, then transferred to the Unix system in the form of a tab-delimited ASCII file. Data from the ASCII files were incorporated into the sam files using the Pstar script `passam`.

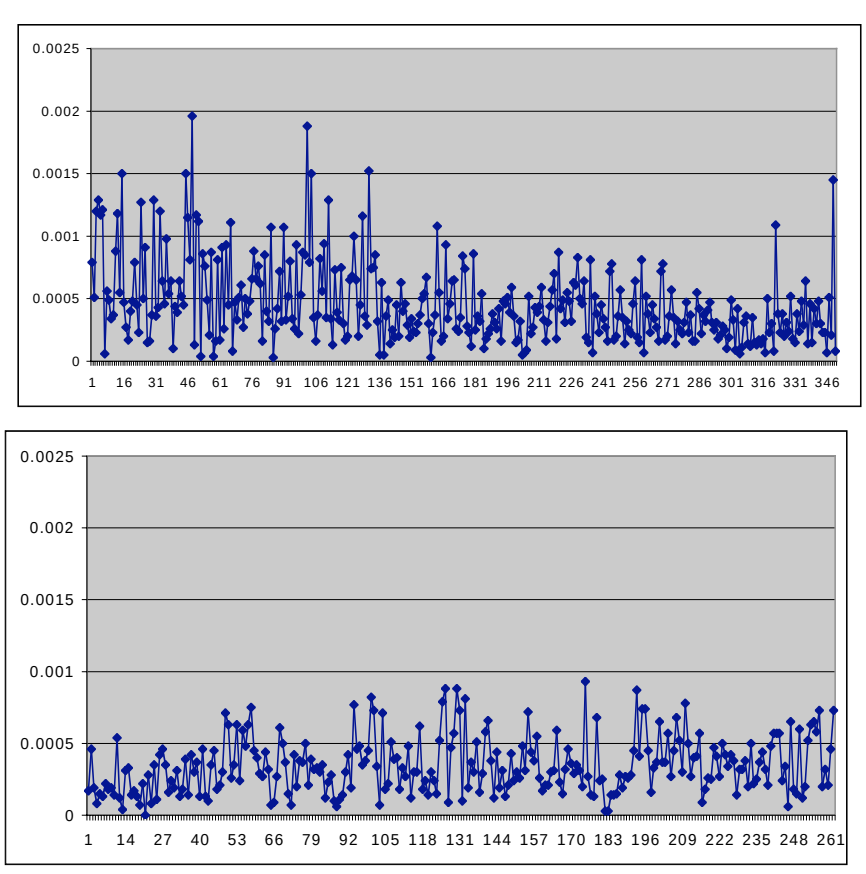


Fig. 4.1 Standard deviation plotted against bottle number, i.e. as a function of time