CTD Calibration cruise Corystes 13/04

11 full depth CTD profiles were obtained using FSI CTD's s/n 1351 during this cruise to the Central North Sea and Dogger Bank region during September 2004.

Samples were collected for salinity analysis (using a Guildline salinometer) to derive a calibration for the instrument conductivity sensor and pairs of digital reversing thermometers used to compare with the CTD temperature estimates. A CHELSEA fluorometer and SEAPOINT turbidity sensor were used at all CTD stations. A LICOR photosynthetically-active-radiation sensor (with a six-decade log amplifier was fitted to the rosette at all CTD stations. Chlorophyll samples were collected to calibrate the fluorometer and samples for suspended particulate matter analysis were used to calibrate the turbidity sensor.

(a) Pressure

During the cruise the 'on deck' CTD pressure immediately prior to lowering the CTD was recorded. These 'on deck' observations have been used to correct recorded CTD pressure as follows:

$$P(cor) = P(unc) + dP$$

CTD s/n 1351		
Station	Pctd on deck	
3	0.3	
15	0.08	
16	0.01	
17	0	
18	0	
19	0	
20	0	
22	0	
33	0.05	
35	0.06	
38	0.05	
Mean	**0.050**	**: Pressure correction**

(b) Temperature

The PRT temperature sensor fitted to CTD 1351 was calibrated using PRT's during March 2004, and this was used to correct the CTD temperature :

$$T(cor) = T(unc) + dT$$

$$dT = a*T(unc)*T(unc) + b*T(unc) + c$$

where a = 2.16e-5 b = -7.13e-4 c = 3.03e-3 for s/n 1351

Electronic thermometers were fitted to two niskin bottles, both often fired at the same depth. The spread of the differences between the PRT and the CTD temperature measurement is consistent with the accuracy of the CTD sensor and thermometers.

(c) Conductivity

For this cruise it is assumed that the tolerance between SAL (WS) and CTD (SAL) is accurate to 0.1 plus the manufacturer tolerance of 0.003. Most of the stations for CTD s/n 1351B, 1366B and 1397B are within the required tolerance.

A least square fit was used to determine appropriate calibration coefficients:

$$CR(cor) = CR(ctd) [a*T(cor) + b*P(cor) + c]$$

where T(cor) and P(cor) are the corrected CTD temperature and pressure and

	s/n 1351B
a	1.1482E-05
b	2.1361E-06
c	0.99969269

Using these coefficients the rms difference between water sample (salinometer) and corrected CTD salinity for s/n 1351B is 0.004 (26 values).

d) Suspended Load – Turbidity Sensor Calibration

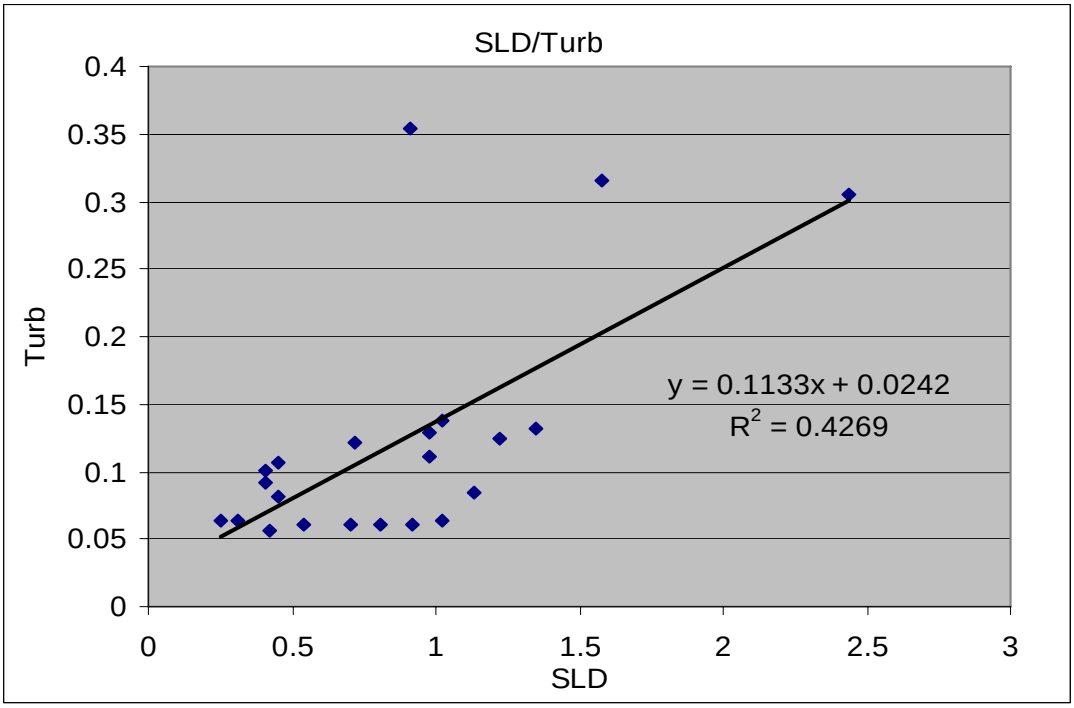
The Seapoint turbidity sensor (s/n unknown) was calibrated by comparing recorded voltages with samples collected (during ascent of the CTD) for suspended load analysis – see Figure 3 below. The figures were derived from the CTDReader application which reads the CTD data at mark along with any extra sensors readings.

$$\text{suspended load (mg/l)} = a * \text{Turbidity (volts)} + b$$

where

a = 0.8826E+01 b = -0.2136E+00 R^2 = 0.4269 (for stations 3 – 47)

Figure 3



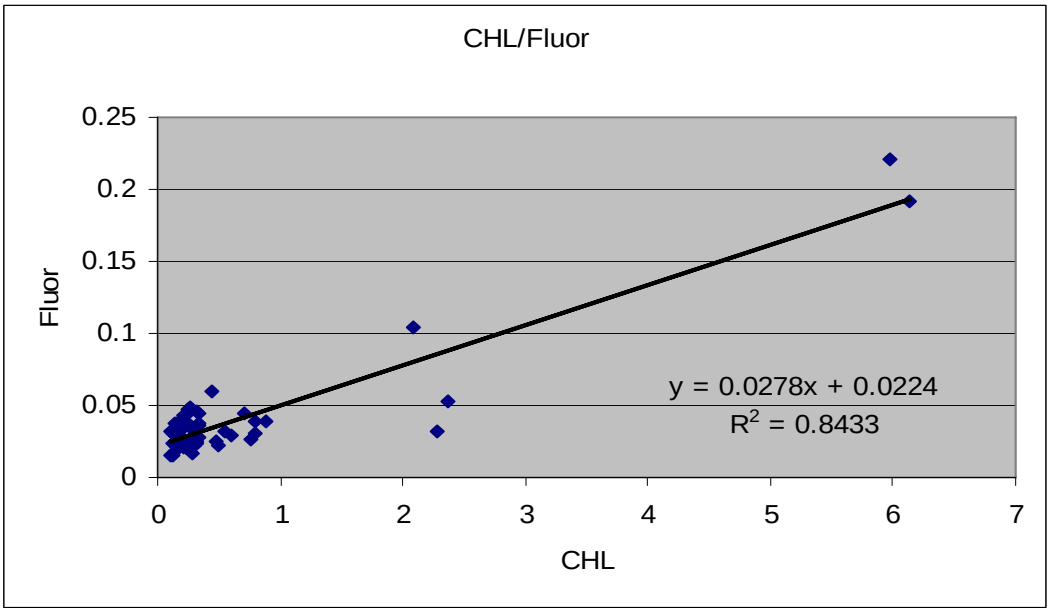
e) Fluorometer - Chlorophyll Calibration

A Seapoint fluorometer (Fluor H) (s/n 2359) was fitted to the rosette sampler and used to estimate chlorophyll levels. The sensor was calibrated by comparing recorded voltages with measured chlorophyll of samples collected in niskin bottles as the CTD rosette returned to the surface – see Figure 4 below. The figures were derived from the CTDReader application which reads the CTD data at mark along with any extra sensors readings.

Chlorophyll (ug/l) = a*Fluorometer (volts) + b

a	b	R^2
35.97	-0.8058	0.8433 (for stations 3 – 47)

Figure 4



f) Photosynthetically Active Radiation

The Licor light sensor (s/n unknown) was calibrated according to the LiCor Amplifier and Sensor calibrations which gave overall factors for calculating uE s-1 m-2. As the s/n was not known an average of Offset X and L.C (calibration constants) were used.

Offset X=3.442471
L.C=0.165669

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Figure incorporated to this document by BODC. Original documentation held by BODC.