

Cruise Report, BATS 1

Cruise dates: October 20, 1988 - October 21, 1988

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R.V. Weatherbird

October 20, 1988

Depart BBSR at 1600 hrs.

Arrive BATS Station at 2130

Start Cast 1, 4200m cast at 2230 using CTD/Rosette.

October 21, 1988

Cast 1 on deck at 0200.

Wire kinked. Decide not to put CTD back down.

Lat: 31.160 N; Long: 64.500 W

Nominal depths: 2000,2200,2400,2600,2800,3000,3200,3400,3600,3800,4000,
4200 m.

Samples:

dissolved O ₂ -duplicates	12 depths
salinity	12 depths
NO ₃ , PO ₄ , SiO ₄ ,	12 depths

Make 1 cast of 12, 12 l Go Flos each, using 2nd winch with 500m stainless
hydrowire. All depths estimated from meter wheel only.

Lat: 31.160 N; Long: 64.500 W

Meter wheel depths: 1,10, 25, 50, 100, 150, 200, 225, 250, 300, 400, 500

Samples:

dissolved O ₂ -duplicates	12 depths
salinity	12 depths
NO ₃ , PO ₄ , SiO ₄ ,	12 depths
CO ₂ - Brewer	11 depths, 1 surface replicate
PON/POC - BBSR	12 depths
Chlor. a - BBSR	12 depths

Return to BBSR at 1800 hrs.

CTD Sensor Corrections to Bottle Data for BATS 1:

Salinity:

$$DS = \sum_{i=0}^n R_i P^i$$

Where:

DS = Wet Salinity - CTD Salinity
R_i = regression coefficients
P = pressure (dbar)
n = order of the polynomial function

$$R_0 = 3.66715E-02$$

$$R_1 = -6.06719E-06$$

$$r^2 = 0.933$$

Oxygen:

$$DO = R_0 + \sum_{i=1}^l A_i \frac{P^i}{4300} + \sum_{i=1}^m B_i \frac{OC^i}{300}$$

$$\therefore MO = OC + 300 \times dO$$

Where:

DO = (wet oxygens-CTD oxygen)/300
OC = uncorrected CTD oxygen (μmole/kg)
P = pressure (dbar)
MO = modified CTD oxygen
A_i, B_i = regression coefficients
l = 4; m = 2

$$R_0 = -1.3241357E+00$$

$$A_1 = 6.5723237E-01$$

$$A_2 = -2.4523143E+00$$

$$A_3 = 3.6429721E+00$$

$$A_4 = -1.7085542E+00$$

$$B_1 = 4.5874012E+00$$

$$B_2 = -3.6559498E+00$$

model correlation coefficient = 9.997E-01

standard deviation of model residuals = 6.598E-01 μmole/kg

Beam Attenuation Coefficient:

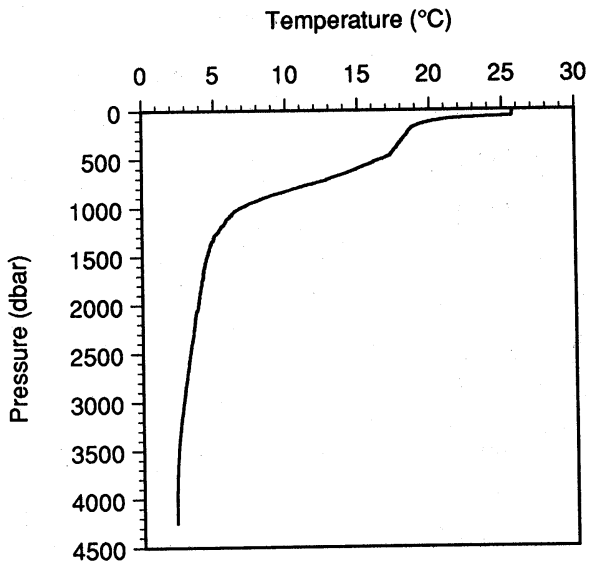
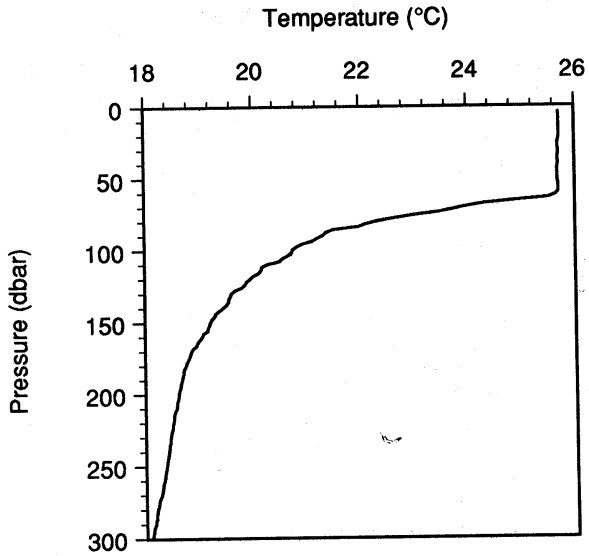
$$BAC \text{ offset} = 0.364 - 0.338 = 0.026 \text{ m}^{-1}$$

BATS 1, CTD Cast 1
20 October, 1988; Start 22:30; End 02:00
Lat: 31.160 N; Long: 64.500 W

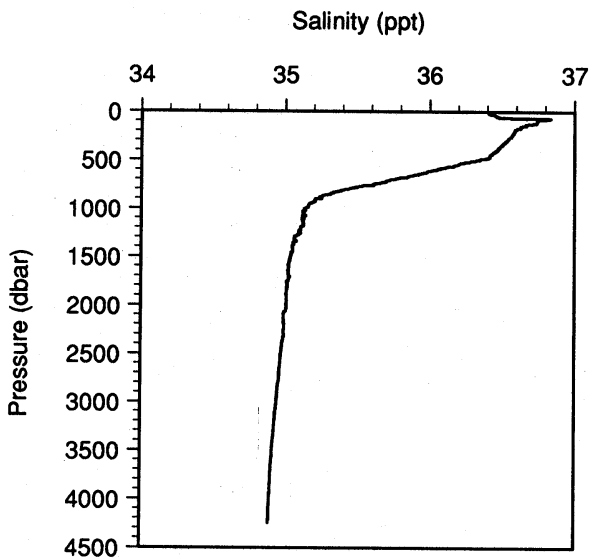
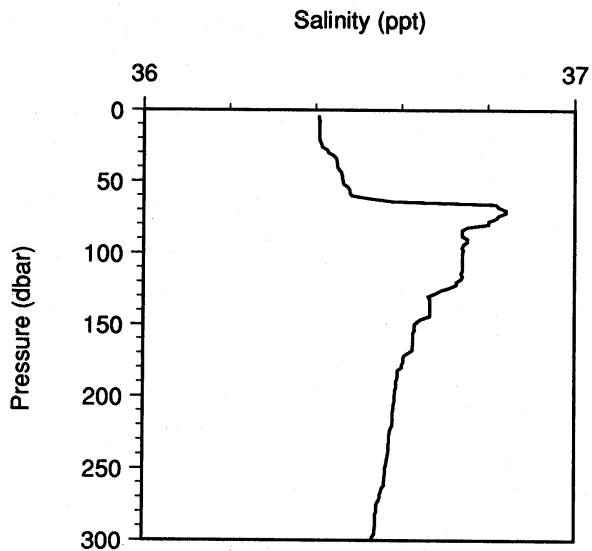
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal (ppt)	Sigma-t (kg/m ³)	CTD O ₂ (μmole/kg)	O ₂ Anom (μmole/kg)	BAC (m ⁻¹)	PAR (μE/m ² /s)	Fluor (rfu)
4.0	4.0	25.711	25.710	36.407	24.188	210.28	8.55	0.438		
10.0	10.1	25.718	25.716	36.408	24.187	212.08	10.37	0.438		
20.0	20.1	25.716	25.712	36.408	24.188	212.82	11.11	0.441		
30.0	30.2	25.701	25.695	36.430	24.210	212.45	10.71	0.439		
40.0	40.3	25.694	25.685	36.451	24.229	210.50	8.76	0.438		
50.0	50.4	25.686	25.675	36.464	24.242	208.87	7.13	0.438		
60.0	60.4	25.688	25.675	36.493	24.263	209.99	8.29	0.438		
70.0	70.5	23.919	23.904	36.842	25.067	214.66	7.36	0.446		
80.0	80.6	22.275	22.259	36.787	25.505	219.45	6.11	0.438		
90.0	90.6	21.286	21.268	36.753	25.757	214.16	-2.97	0.434		
100.0	100.7	20.751	20.732	36.742	25.895	207.93	-11.30	0.428		
110.0	110.8	20.247	20.226	36.742	26.032	206.44	-14.78	0.416		
120.0	120.9	19.938	19.915	36.727	26.104	207.72	-14.77	0.416		
130.0	131.0	19.601	19.576	36.664	26.145	213.23	-10.73	0.411		
140.0	141.0	19.421	19.395	36.666	26.194	214.53	-10.15	0.408		
150.0	151.1	19.209	19.181	36.630	26.222	212.13	-13.48	0.407		
160.0	161.2	19.041	19.012	36.627	26.263	212.06	-14.26	0.407		
170.0	171.3	18.850	18.819	36.610	26.300	213.04	-14.11	0.407		
180.0	181.3	18.737	18.705	36.595	26.318	212.22	-15.43	0.407		
190.0	191.4	18.672	18.638	36.588	26.330	210.98	-16.95	0.406		
200.0	201.5	18.619	18.583	36.585	26.341	211.59	-16.57	0.406		
210.0	211.6	18.560	18.522	36.580	26.353	213.09	-15.32	0.403		
220.0	221.7	18.501	18.462	36.578	26.366	214.42	-14.25	0.403		
230.0	231.7	18.459	18.418	36.573	26.374	215.16	-13.70	0.403		
240.0	241.8	18.415	18.372	36.569	26.382	215.89	-13.16	0.403		
250.0	251.9	18.378	18.334	36.564	26.388	216.01	-13.21	0.403		
275.0	277.1	18.227	18.179	36.544	26.412	214.05	-15.85	0.401		
300.0	302.3	18.089	18.036	36.531	26.437	210.60	-19.91	0.398		
325.0	327.5	17.957	17.899	36.509	26.454	207.31	-23.81	0.398		
350.0	352.7	17.812	17.750	36.493	26.479	206.12	-25.66	0.398		
375.0	378.0	17.708	17.642	36.476	26.493	205.05	-27.21	0.398		
400.0	403.2	17.546	17.477	36.458	26.519	204.65	-28.35	0.394		
425.0	428.4	17.419	17.345	36.435	26.534	203.53	-30.07	0.394		
450.0	453.6	17.291	17.213	36.414	26.550	203.10	-31.10	0.393		
475.0	478.9	17.000	16.918	36.406	26.615	201.61	-33.90	0.393		
500.0	504.1	16.610	16.526	36.320	26.642	190.89	-46.54	0.392		
550.0	554.6	15.765	15.675	36.174	26.726	181.39	-60.21	0.390		
600.0	605.1	14.890	14.794	36.017	26.802	174.74	-71.33	0.390		
650.0	655.6	13.944	13.845	35.888	26.907	167.59	-83.41	0.385		
700.0	706.1	12.905	12.803	35.729	26.998	155.72	-100.94	0.385		
750.0	756.6	11.774	11.670	35.612	27.128	142.80	-120.20	0.385		
800.0	807.2	10.432	10.328	35.406	27.213	129.19	-141.85	0.387		
850.0	857.7	9.288	9.184	35.298	27.322	126.05	-152.07	0.385		
900.0	908.3	8.259	8.155	35.206	27.413	143.05	-141.71	0.385		
950.0	958.9	7.402	7.298	35.164	27.506	170.40	-120.04	0.385		
1000.0	1009.4	6.684	6.579	35.130	27.579	196.00	-99.36	0.383		
1050.0	1060.0	6.242	6.134	35.123	27.633	213.83	-84.61	0.381		
1100.0	1110.7	5.902	5.791	35.127	27.680	225.66	-75.17	0.382		
1150.0	1161.3	5.697	5.582	35.127	27.706	234.52	-67.76	0.377		
1200.0	1211.9	5.412	5.293	35.107	27.725	241.83	-62.55	0.377		
1300.0	1313.2	4.933	4.807	35.062	27.747	252.17	-55.82	0.376		

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal (ppt)	Sigma-t (kg/m ³)	CTD O ₂ (μmole/kg)	O ₂ Anom (μmole/kg)	BAC (m ⁻²)	PAR (μE/m ² /s)	Fluor (rfu)
1400.0	1414.6	4.659	4.524	35.051	27.770	256.46	-53.59	0.373		
1500.0	1516.0	4.432	4.287	35.036	27.784	258.89	-52.91	0.373		
1600.0	1617.4	4.273	4.118	35.026	27.795	260.21	-52.82	0.368		
1700.0	1718.9	4.183	4.017	35.025	27.804	260.67	-53.05	0.368		
1800.0	1820.5	4.032	3.855	35.012	27.811	261.08	-53.83	0.368		
1900.0	1922.1	3.934	3.745	35.011	27.821	261.48	-54.19	0.368		
2000.0	2023.7	3.832	3.632	35.010	27.832	261.80	-54.66	0.367		
2100.0	2125.4	3.650	3.439	34.991	27.836	261.98	-55.95	0.368		
2200.0	2227.2	3.562	3.340	34.993	27.847	261.84	-56.77	0.368		
2300.0	2328.9	3.479	3.244	34.990	27.854	261.93	-57.34	0.366		
2400.0	2430.8	3.345	3.099	34.979	27.859	262.24	-58.12	0.366		
2500.0	2532.7	3.238	2.979	34.971	27.864	263.52	-57.71	0.365		
2600.0	2634.6	3.143	2.872	34.967	27.871	264.65	-57.35	0.366		
2700.0	2736.6	3.049	2.765	34.962	27.876	265.10	-57.67	0.364		
2800.0	2838.6	2.935	2.638	34.952	27.880	265.44	-58.28	0.367		
2900.0	2940.7	2.847	2.537	34.949	27.886	266.99	-57.45	0.365		
3000.0	3042.8	2.744	2.421	34.940	27.889	268.59	-56.71	0.364		
3100.0	3144.9	2.660	2.322	34.937	27.894	268.57	-57.43	0.364		
3200.0	3247.2	2.574	2.223	34.929	27.897	268.78	-57.93	0.364		
3300.0	3349.4	2.496	2.131	34.923	27.900	269.00	-58.37	0.364		
3400.0	3451.7	2.419	2.039	34.917	27.902	268.81	-59.21	0.364		
3500.0	3554.1	2.382	1.986	34.913	27.903	268.02	-60.32	0.364		
3600.0	3656.5	2.334	1.923	34.908	27.904	268.55	-60.20	0.366		
3700.0	3758.9	2.302	1.874	34.905	27.906	268.55	-60.48	0.365		
3800.0	3861.4	2.278	1.834	34.902	27.906	267.23	-62.01	0.368		
3900.0	3964.0	2.263	1.802	34.899	27.906	266.97	-62.39	0.369		
4000.0	4066.5	2.254	1.775	34.896	27.906	266.57	-62.88	0.373		
4100.0	4169.2	2.244	1.747	34.894	27.907	266.18	-63.36	0.377		

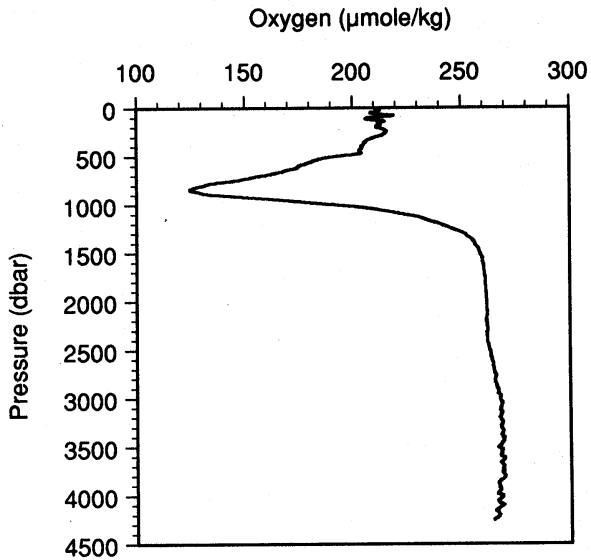
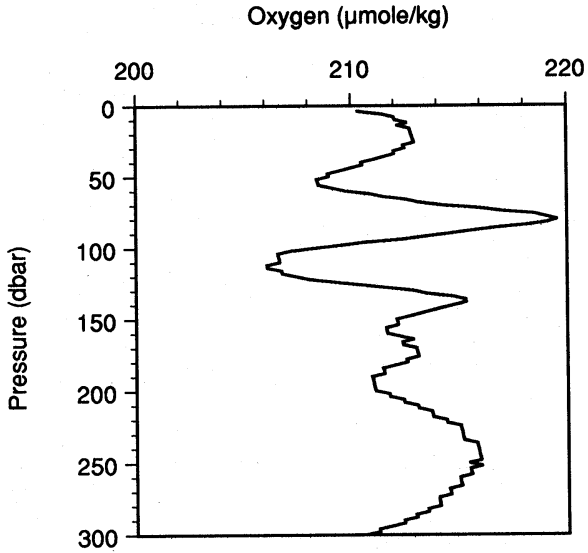
BATS 1—CTD Temperature Profile



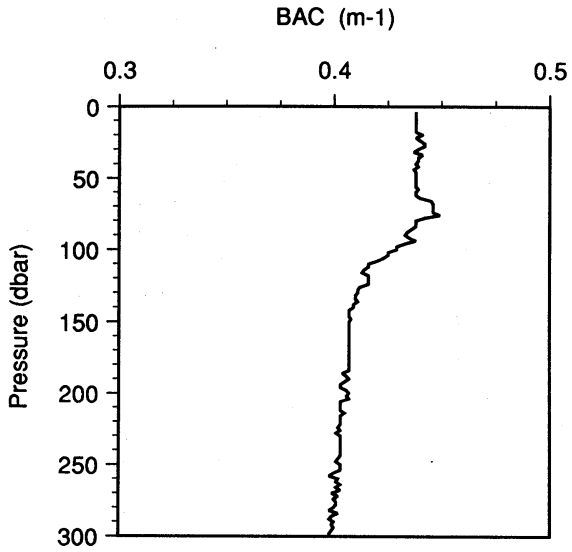
BATS 1—CTD Salinity Profile



BATS 1—CTD Oxygen Profile



BATS 1—CTD BAC Profile



BATS 1—Bottle Data
October 20-21, 1988
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	Pot. Temp (°C)	Salinity (ppt)	Sigma-t (kg/m ³)
G0102G12	1.0				36.389	
G0102G11	10.0				36.390	
G0102G10	25.0				36.454	
G0102G09	50.0				36.499	
G0102G08	100.0				36.670	
G0102G07	150.0				36.569	
G0102G06	200.0				36.548	
G0102G05	225.0				36.552	
G0102G04	250.0				36.544	
G0102G03	300.0				36.512	
G0102G02	400.0				36.445	
G0102G01	500.0				36.303	
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G0101G12	2000.5	2024.8	3.820	3.620	34.993	27.820
G0101G11	2200.3	2227.3	3.580	3.357	34.982	27.837
G0101G10	2398.9	2429.8	3.320			
G0101G09	2600.0	2634.7	3.130	2.859	34.957	27.864
G0101G08	2801.7	2840.8	2.930	2.633	34.944	27.874
G0101G07	3000.9	3043.0	2.740	2.416	34.943	27.892
G0101G06	3200.6	3248.4	2.560	2.209	34.927	27.896
G0101G05	3400.3	3451.9	2.410			
G0101G04	3600.4	3656.7	2.330	1.919	34.917	27.912
G0101G03	3803.5	3865.7	2.280	1.835	34.901	27.905
G0101G02	4001.5	4068.8	2.250	1.771	34.893	27.904
G0101G01	4202.4	4272.0	2.240	1.725	34.888	27.903
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BATS 1—Bottle Data
October 20-21, 1988
Gases

Bottle ID	Depth (m)	O ₂ (1)	O ₂ (2)	O ₂ (1) anomaly	O ₂ (2) anomaly	TCO ₂	
		(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(1)	(2)
G0102G12	1.0	211.34	210.04			2008.9	2009.8
G0102G11	10.0	211.34	210.91			2020.1	2008.1
G0102G10	25.0	211.77	211.33			2013.4	2010.7
G0102G09	50.0	213.94				2013.1	2010.7
G0102G08	100.0	208.22				2066.3	2076.5
G0102G07	150.0	211.19	209.88			2074.4	
G0102G06	200.0	213.33	212.46			2079.9	2070.9
G0102G05	225.0	215.50					2070.3
G0102G04	250.0	215.93					
G0102G03	300.0	210.27	210.71			2068.1	2072.3
G0102G02	400.0	204.18	202.01			2084.5	2081.2
G0102G01	500.0	189.83	190.27			2092.0	2108.8
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Bottle ID	Depth (m)	O ₂ (1)	O ₂ (2)	O ₂ (1) anomaly	O ₂ (2) anomaly	TCO ₂	
		(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(1)	(2)
G0101G12	2000.5	260.85		-28.01			
G0101G11	2200.3	262.15		-28.24			
G0101G10	2398.9						
G0101G09	2600.0	264.74		-28.83			
G0101G08	2801.7	266.47		-28.65			
G0101G07	3000.9	268.64		-28.04			
G0101G06	3200.6	268.63		-29.64			
G0101G05	3400.3						
G0101G04	3600.4	267.75		-32.76			
G0101G03	3803.5						
G0101G02	4001.5	266.45		-35.23			
G0101G01	4202.4	264.72		-37.34			

BATS 1—Bottle Data
October 20-21, 1988
Nutrients

Bottle ID	Depth (m)	Nitrate+Nitrite (μmole/kg)	Phosphate (μmole/kg)	Silicate (μmole/kg)
G0102G12	1.0	0.00	0.00	1.04
G0102G11	10.0	0.00	0.00	1.18
G0102G10	25.0	0.00	0.00	1.08
G0102G09	50.0	0.00	0.00	1.02
G0102G08	100.0	2.20	0.04	1.14
G0102G07	150.0	1.31	0.00	0.96
G0102G06	200.0	2.55	0.05	1.13
G0102G05	225.0	2.74	0.00	1.22
G0102G04	250.0	2.51	0.06	1.34
G0102G03	300.0	3.92	0.07	1.43
G0102G02	400.0	5.23	0.19	1.91
G0102G01	500.0			

BATS 1—Bottle Data
October 20-21, 1988
Particulates

Bottle ID	Depth (m)	Chl <i>a</i> ($\mu\text{g}/\text{kg}$)	POC ($\mu\text{g}/\text{kg}$)	PON ($\mu\text{g}/\text{kg}$)	Bacteria ($\# \times 10^6/\text{kg}$)
G0102G12	1.0	0.048			1.23
G0102G11	10.0	0.048			1.58
G0102G10	25.0	0.059			1.55
G0102G09	50.0	0.062			1.93
G0102G08	100.0	0.134			0.93
G0102G07	150.0	0.047			0.32
G0102G06	200.0	0.012			0.35
G0102G05	225.0	0.008			0.34
G0102G04	250.0	0.007			0.28
G0102G03	300.0	0.007			
G0102G02	400.0	0.007			
G0102G01	500.0				
