Bermuda Biological Station for Research
U.S Joint Global Ocean Flux Study
Bermuda Atlantic Time-series Study

Data Report for BATS 61 - BATS 72
October, 1993 - September, 1994

Anthony J. Knap
Anthony F. Michaels
Dennis Hansell
Frederick Bahr
Nicholas Bates
Susan Becker
Elizabeth Caporelli
Ann R. Close
Alice P. Doyle
Rachael L. Dow
Rodney J. Johnson
Rhonda Kelly
Rebecca Little
Kjell Gundersen
Frances A. Howse
Tye Waterhouse

Bermuda Biological Station for Research, Inc.
Ferry Reach, GE01 Bermuda

Table of Contents

BATS 64

BATS 65

BATS 65A

BATS 66

BATS 66A

BATS 67

BATS 67A

BATS 68

BATS 68A

Introduction

The Joint Global Ocean Flux Study (JGOFS) is an international and multi-disciplinary study with the goal of understanding the role of the oceans in global carbon and nutrient cycles. The Scientific Council on Ocean Research describes this goal for the international program: "To determine and understand the time-varying fluxes of carbon and associated biogenic elements in the ocean, and to evaluate the related exchanges with the atmosphere, sea floor and continental boundaries." As part of this effort in the United States, the National Science Foundation has funded two time-series stations, one in Bermuda and the second in Hawaii. The Bermuda Atlantic Time-series Study (BATS) is administered by the Bermuda Biological Station for Research, Inc. (BBSR) with Dr. Anthony H. Knap as the principal investigator (NSF Grant No. OCE-8801089). In 1993, funding for this program was extended with Drs. Anthony Knap and Anthony Michaels as co-principal investigators.

The objectives of the JGOFS time-series study at Bermuda are: (1) to observe and interpret the annual and interannual variability in the biology and chemistry of the mixed layer and euphotic zone; (2) to observe and interpret the annual and interannual variability in the rates of particle flux and the apparent rates of particle remineralization over the entire water column; (3) to understand the interrelationships between the biological and chemical processes involved in (1) and (2) above and the physical characteristics of the water column; and (4) to provide data on global trends of selected oceanic properties over decadal time scales.

Data collection for the Bermuda Atlantic Time-series Study began in October, 1988, with a gradual phase-in of the current set of measurements over a two to three month period. This report presents the results from the sixth 12 month period of data collection, October 1993 through September 1994. During this period, there were 12 core cruises, BATS 61-72, and 4 shorter bloom cruises during the spring (BATS 65a, 66a, 67a and 68a).

This is the sixth in a series of documents which is one mechanism for the dispersal of the time-series data. The data are also available in digital form through NODC (Woods Hole Oceanographic Institution) or on request from BBSR (rod@bbsr.edu or bahr@bbsr.edu) and on an anonymous ftp account. The appropriate account is ftp.bbsr.edu (198.116.90.3). The user should Log in as anonymous and use his/her own account name as the password. The BATS data are in pub/BBSR/BATS, with each BATS year after that. There are readme files in all the directories and subdirectories that describe the contents. Prior to March 1996, the ftp site was resident at UCSB. However this site is now located at BBSR and during this move, it was also decided to change the format of all data files such that they are consistent with newer access methods. The BATS data are presently being integrated into the JGOFS Data Management System, information for which can be obtained from Christine Hammond at WHOI (chammond@whoi.edu).

The recommended method of data access is via the World Wide Web, where data can be accessed through the homepage of the Bermuda Biological Station (URL - http://www.bbsr.edu) using a link to a data extraction program (URL- http://www.bbsr.edu/~ctd). At the URL location users will find a convenient routine which allows extraction of multiple parameters for any selected time period or cruise list.

The time-series program is the joint effort of a large number of people. Dr. Anthony H. Knap, the director of BBSR, is the principal investigator. Dr. Anthony F. Michaels, an Associate Research Scientist at BBSR, joined the program in September, 1989 and became a co-principal investigator with the renewal in 1993. Rachael Dow, the head technician, and Rodney Johnson have been a part of the program since the beginning. They were joined by Kjell Gundersen in the first year, Jens Sorensen in April, 1990, Ann Close in May, 1990, Frances Howse in April, 1991, Nicholas Bates and Margaret Best in May, 1991, Melodie Hammer in June, 1991, Alice Doyle in January, 1992, Dennis Hansell in August, 1992, Tye Waterhouse in January 1993, Rhonda Kelly in May, 1993, Elizabeth Caporelli and Frederick Bahr in September, 1993 and Rebecca Little and Susan Becker in January 1994.

This document begins with a summary of the BATS methods and updates on methods that changed in year six. A more detailed description of these methods is available as a special report from the BBSR Library or from the U.S. JGOFS Planning Office, (see BATS Methods Manual 4). Following the methods summary is a cruise by cruise breakdown of the year six data. Each cruise report begins with a narrative describing the sampling scheme of the cruise. Any qualifiers on data quality and calibration are included here. A map shows the locations of each CTD cast and the trap deployment and recovery positions. The CTD data are presented next as a table of the 2 dbar averaged values on regular depth intervals. The CTD tables are followed by a series of figures of the CTD data at the 2 dbar resolution. Discrete data from the Niskin bottle casts follows in the subsequent five sections: physical data, gases, nutrients, particulates and HPLC pigments. Finally, the primary production, bacterial growth and sediment trap data are reported.

Methods Summary

The U.S. JGOFS Bermuda Atlantic Time-series Study (BATS) sampling protocol consists of a single four to five day cruise at monthly intervals. The core set of samples, listed in Table 1, is collected from two to four hydrocasts, and includes one measurement of integrated primary production and one three-day sediment trap deployment. The cruises follow a regular schedule for the sequence and timing of events, which is described below. Weather, equipment problems and ancillary activities occasionally cause this schedule to be adjusted. Therefore, in the narrative for each cruise the exact schedule is reported. The schedule described below represents a summary of all the core activities on each cruise in the order that they would be performed barring any problems.

The transit time to the BATS station (31°40' N, 64°10' W) is approximately 6 hours. Each cruise begins with the deployment of a shallow surface-tethered sediment trap array with Multi-traps at 150, 200 and 300 meters. The actual deployment of the array takes place five miles SE of the BATS site to avoid entanglement with moorings in the area. The trap is free-floating and equipped with a strobe, radio beacon and an Argos satellite transmitter. The array is left to drift for approximately 72 hours while the remainder of the core measurements are made. Following deployment of the trap array, hydrocasting usually begins with a deep cast (sampled from 300 to 4200 m). Dawn to dusk primary production is measured *in situ* on the second day using a free drifting array. The shallow cast(s), 0 to 250 m, occurs while the primary production array is drifting. For BATS 61-69, the ship

remained near the sediment trap array for the entire of the sampling period, resulting in a quasi-Lagrangian sampling plan. For BATS 70-72, the CTD casts were performed at the BATS station or at a site close to the production array (typically < 5nm from the BATS station. The location of each CTD cast is plotted in the cruise reports. Bloom cruises are similar to the monthly core cruises, except that no sediment trap array is deployed and only the shallow cast(s) is performed. More detailed information on the hydrocasts follows.

For BATS 61-72, sampled on board the R/V *Weatherbird II,* core measurements were taken from two hydrocasts using a 24-position CTD-rosette system equipped with 24- 12 liter Niskin bottles.

Cast 1: 0-4200 m (deep core cast). Bottle samples are collected at depths of 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2800, 3000, 3400, 3600, 4000, 4200. A duplicate niskin is fired at 3000 m.

Cast 2: 0-250 m (shallow core cast). Bottle samples are collected at depths of 250, 200 and ten other depths between 0 and 200 m, with duplicate Niskins fired at each depth. The ten surface depths are chosen to sample features seen in the continuous profiles of temperature (mixed layer, upper thermocline), fluorescence (fluorescence maximum, other maxima and minima) and beam attenuation (particle maxima). Typical depths are 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m

Shipboard Sampling

Water sampling begins immediately after the rosette is brought on board and secured. Sampling schemes vary depending upon the depth of the cast, but for all casts oxygen samples (and their replicates) are drawn first and their draw temperature recorded. After the oxygens, one or two samples for total CO_2 and alkalinity (0-250 m only) are collected, followed by a single salinity sample (replicates at the four deepest depths) and dissolved organic carbon and dissolved organic nitrogen samples. For the samples below 1000 m, the next step is to draw bacterial, silicate and nutrient samples, in that order. For sampling between 300 and 1000 m, the nutrient samples are drawn after the particulate silica (not reported here) and particulate organic carbon and nitrogen samples. On the shallow casts, 0-250 m, silica and nutrient sampling follow the DOC and DON collection. The replicate depths from 0-250 m are used for particulate silica, particulate organic carbon and nitrogen samples, chlorophyll determination, bacteria enumeration and samples for HPLC determination of pigments.

Deckboard water sampling activities are usually divided into specific tasks. Two or three people draw the water while one person keeps track of the sampling operation. Bottle numbers for samples at each depth are determined prior to the cast. All samplers are informed of the sampling scheme and the oversight person ensures that it is accurately carried out.

The primary production cast is generally performed on the second day, depending on the weather, time of arrival at station, etc. The dawn to dusk *in situ* production measurement involves the pre-dawn collection of water samples at 8 depths (1, 20, 40, 60, 80, 100, 120, 140 m) using trace-metal clean sampling techniques. Water is collected in 12 liter Go-Flo bottles fitted with Viton O-rings. The bottles are mounted on a Kevlar line and depths are measured with a metered block, or premeasured before the cast, and marked with tape.

The bottles are brought back on deck, the samples are processed (see Primary Production section), and the array is deployed. The ship follows this production array during the 12–15 hour deployment period, occasionally shuttling back to the trap location. Approximately one half hour after sunset this array is recovered and processed. We attempt, weather permitting, to make the shallow CTD casts during the production deployment period.

The sediment trap array is allowed to drift free for a 72 hour period. Its location is monitored at BBSR via the ARGOS transponder and by regular relocation by the ship. Twice daily, the trap position is radioed to the ship by BBSR personnel. The rate of drift can be considerable, as much as 100 km in three days.

Sample Processing

Most of the actual sample analyses are done ashore at the Bermuda Biological Station for Research, Inc. Oxygen samples are analyzed at sea because of concerns regarding the extended storage of these samples. Oxygen samples collected on the last day are sometimes returned to shore for analysis. All other measurements have preservation techniques that enable the analysis to be postponed.

CTD and Related Instruments

Introduction

This section describes the CTD processing methods and equipment used for BATS cruises 61-72. Specific configurations for this series of cruises is given below. While only an outline of the data processing steps is given in the following sections, a more comprehensive description is available in the BATS Methods Manual, version #4.

Equipment

The basic system used to acquire CTD data is a Sea-Bird SBE 9/11 *plus* CTD, with an internal Digiquartz pressure sensor, a Sea-Bird SBE-03f temperature sensor, a Sea-Bird SBE-04 conductivity cell and a Sea-Bird SBE-05 pump. Additional sensors include the Sea-Bird SBE-13 dissolved oxygen sensor, the Sea-Tech transmissometer and the Sea-Tech fluorometer. Present configuration also includes a secondary temperature sensor, conductivity sensor and pump, all connected independently from the primary units. The temperature and conductivity sensors are connected by a standard Sea-Bird "TC-duct" (clear, low viscous type) which ensures that the same parcel of water is sampled by both sensors, improving the accuracy of the computed salinity. The dissolved oxygen sensor is connected downstream from the conductivity cell and the flow rate through this sensor configuration is maintained at a steady rate by the inertia balanced SBE-05 pump. This pumped flow through system introduces a slight warming of the water parcel as it passes trough the "TC-duct" due to viscous effects (Nordeen Larson, Sea-Bird Electronics, personal communication). The error in measured temperature is greatest in the deep water and is typically less than 0.003°C. A correction for this heating effect will be made available in the near future. The pressure sensor is insulated by standard Sea-Bird methods and consequently has minimal thermal errors in its signal.

Pressure: Sea-Bird model 410K-023 digiquartz pressure sensor with 12-bit A/D temperature compensation. Range: 0–7000 dbar. Depth resolution: 0.004% full scale. Response time: 0.001 s.

Temperature: SBE 3–02/F. Range: -5 to 35°C. Accuracy: ±0.003°C over a 6 month period. Resolution: 0.0003°C. Response time: 0.082 s at a drop rate of 0.5 m sec^{-1}.

Conductivity (flow-through cell): (flow-through cell): SBE 4-02/0. Range: 0-7 Siemens m^{-1}. Accuracy ±0.003 S m^{-1} $year^{-1}$. Resolution: 5 x 10^{-5} S m^{-1}. Response time: 0.084 s at a 0.5 m s^{-1} drop rate with the pump.

Pump: SBE 5-02. Typical flow rate for the BBSR system is approximately 15 ml s^{-1}. (The pump is used to control the flow through the conductivity cell to match the response time to the temperature sensor. It is also used to pull water through the dissolved oxygen sensor.)

Dissolved Oxygen (Flow-through cell): SBE 13-02 (Beckman polargraphic type) Range: 0-15 ml l^{-1}. Resolution: 0.01 ml l^{-1}. Response time: 2 seconds.

Beam Transmission: Sea Tech, 25 cm path-length. Light source wavelength = 670 nm. Depth range: 0–5000 m.

Fluorescence: Sea-Tech SN/83 (plastic housing). Three sensitivity settings: 0-3 mg/m^3 (used in BATS), 0-10 mg/m^3, and 0-30 mg/m^3 . Excitation: 425 nm peak, 200 nm FWHM. Emission: 685 nm peak, 30nm FWHM. The fluorescence unit is rated to 500m depth and is only used on shallow casts.

Calibration: The temperature sensor, conductivity cell and dissolved oxygen sensor are returned to Sea-Bird approximately twice a year for routine calibration. Pumps are returned to Sea-Bird once a year for routine diagnostic checks for RPM accuracy and pump head integrity. The pressure transducer is calibrated every 3 years and it is usual that this calibration is performed during complete CTD maintenance checks or upgrades at Sea-Bird.

CTD and Rosette Configurations for BATS cruises 61-72:

For BATS 61-72, the BBSR Sea-Bird SBE-9/11 *plus* system (SN 91377) was used with a 24 place General Oceanics model 1016-24 Smart rosette equipped with twenty-four 12 liter Niskin bottles. Data was aquired at a rate of 24Hz. The package was deployed on a triple conductor hydrowire. For BATS 70-72, the CTD had dual temperature and conductivity sensors.

CTD Operation and Data Collection

The CTD is operated as per Sea-Bird's suggested methods. The CTD is powered up and allowed to stabilize at a depth of approximately 5 meters prior to profiling. This stabilization period is important for both the conductivity and dissolved oxygen sensors which have typical warm up times of one and five minutes respectively. Once stable the CTD is brought back to surface from which point the profile begins. The package is dropped at 30-60 m per minute for the first 200 m and then 45-60 m per minute from 200 meters down. The larger 24 position rosettes are found to give significant eddy wake problems which are most obvious in stratified regions. During high sea states these wakes can result in sections of the water column, as large as 4 m, being contaminated with

entrained water. To help alleviate this mechanical problem, the CTD is always dropped at the maximum permitted speed. At present, BBSR is developing an exoskeleton type frame which will be used to mount secondary temperature and conductivity sensors away from the package. On discussion with Sea-Bird, some data processing steps were suggested to help reduce these bad data. However, at this stage no suitable algorithms other than the accepted velocity and acceleration filters have been developed. Ultimately, we believe this problem needs to be addressed as a package dynamics problem as opposed to a software filter routine. A offset exists between the down- and upcast profiles which is most likely an additional artifact of the package wake. The offset is greatest in the seasonal and permanent thermoclines where differences between the down- and upcast temperatures can be as large as 0.4°C. Since the sensors are mounted below the Niskins, we believe the error to be biased in the upcast data (Nordeen Larson, personal communication).

Water samples are collected on the upcast. Prior to closing each Niskin, the CTD is kept at the desired depth for a minimum of 90 seconds which ensures that the entrainment from the following wake has been removed. Analysis of the temperature and conductivity data at the time of the Niskin closure (following the wait period) shows good agreement with the downcast data. Once the water sample is taken the CTD immediately continues with the upcast.

Except as noted, data are acquired using the Sea-Bird software "Seasoft" at the full scan rate of 24Hz. The data are stored directly on a PC-486. Immediately following the completion of the cast, the data are backed up to a Pinnacle Micro PMO-650 magneto optical drive.

Data Processing

The data processing is completed at BBSR and can be divided into two sections.The first section is performed on a IBM-PC using the Sea-Bird "Seasoft" software and essentially performs the dynamic corrections to the sensors. The raw 24Hz data are first converted to engineering units using the most recent calibration data. The data are next checked for bad values and erroneous noise. All primary channels, plus the oxygen current and oxygen temperature are run through a 21point median filter. The oxygen channels have a large variance in their signals which is effectively reduced by applying a 21 point Gaussian filter. Additional channels used to measure beam attenuation and in vivo fluorescence are not passed through any filters. The temperature, conductivity and dissolved oxygen are then checked for alignment in time relative to pressure. For BATS 61-72 it was found that temperature and conductivity were not required to be advanced relative to pressure, and further that the conductivity sensor was not required to be advanced relative to temperature. It should be noted that the SBE-11 deck unit was set to automatically advance conductivity 1.75 scans. The dissolved oxygen sensor was required to be aligned to pressure since its time constant is relatively long compared to the other sensors. To determine an appropriate time advance, a range of values from 3-10 seconds using 0.5 second increments were used. The value chosen was that which best reduced the difference between the downcast and upcast data (see Table 2 for values used). The next step is to correct the conductivity cell for its thermal mass which involves determining two coefficients namely, the thermal anomaly amplitude (alpha) and the thermal anomaly time constant (tau). The values of alpha and beta that are chosen, are those which best minimize

the difference between down and up-cast salinity relative to temperature. The typical range of alpha values are 0.01-0.06 and for tau values range from 6-9.

Table 2. - Dynamic Corrections for Conductivity and Oxygen Sensors

		Conductivity		Oxygen	
Cruise	**#SN**	**alpha**	**tau (s)**	**S**	**N O:P (s)**
61	669	0.03	7.0	13153	3.0
62	669	0.04	7.0	13153	3.0
63	669	0.03	7.0	13153	3.5
64	669	0.03	7.0	13153	3.5
65	760	0.03	7.0	13153	4.5
65a	760	0.03	7.0	13153	4.5
66	760	0.03	7.0	13153	4.5
66a	760	0.04	7.0	13153	4.5
67	760	0.04	7.0	13153	5.5
67a	760	0.04	7.0	13153	4.5
68	760	0.04	8.0	13153	4.5
68a	760	0.03	7.0	13153	5.5
69	760	0.04	8.0	13153	5.5
70	760	0.03	9.0	13153	6.0
71	669	0.03	9.0	23244	7.5
72	669	0.03	7.0	13153	5.5

The salinity and dissolved oxygen are computed once the dynamic corrections have been applied. The data are passed through a velocity filter which excludes all scans for which either the pressure is not increasing or the descent rate is less than 0.3m/second. The data are then averaged in 2Hz bins.

The second stage of processing is done on a Sun Sparc station using the Matlab programming environment. This stage involves applying the static drift corrections and any empirical field calibrations, to the dynamically corrected 2Hz data.

Temperature Corrections: The Sea-Bird temperature sensors are found to have characteristic drift rates which are linear in time with a small or zero dependency on the temperature (for 2°C < T < 30°C). For each cruise the calibration history is used to determine monthly drift rates which are applied to the most recent calibrations. The corrected temperature measurement T, is given by:

$$T = T_u + t(T_s T_u + T_o)$$

Where:

T_u	=	uncorrected *in situ* temperature (°C)
t	=	time from most recent calibration (months)
T_s	=	slope correction (/ month)
T_o	=	offset correction (°C/month)

Table 3. - Static Corrections for Temperature Sensor

Cruise #	SN	Months	Offset	Slope
61	876	6	-5.59e-4	2.055e-5
62	876	7	-5.59e-4	2.055e-5
63	876	8	-5.59e-4	2.055e-5
64	876	9	-5.59e-4	2.055e-5
65	1079	1	2.00e-4	0.000e+0
65a	1079	1.5	2.00e-4	0.000e+0
66	1079	2	2.00e-4	0.000e+0
66a	1079	2.5	2.00e-4	0.000e+0
67	1079	3	2.00e-4	0.000e+0
67a	1079	3.5	2.00e-4	0.000e+0
68	1079	4	2.00e-4	0.000e+0
68a	1079	4.5	2.00e-4	0.000e+0
69	1079	5	2.00e-4	0.000e+0
70	1079	6	2.00e-4	0.000e+0
71	876	3	-1.08e-4	0.000e+0
72	876	4	-1.08e-4	0.000e+0

Pressure Corrections: The Sea-Bird Digiquartz pressure sensor is found to have a characteristic linear drift with time which is typically less than 0.5 dbar per year. The drift is monitored on a 6 monthly basis under stable conditions at the dock. To determine the drift the CTD is allowed to stabilize for about 3 hours. The drift, P_d (in dbar), from Sea-Bird calibrations is determined by:

$$P_d = P_s - \frac{(P_a - P_{astd})}{10}$$

Where:

P_s	=	stable CTD pressure reading (dbar)
P_a	=	atmospheric air pressure (mbar)
P_{astd}	=	one standard atmosphere (1013.25 mbar)

Table 4. - Static Corrections for Pressure Sensor

Cruise #	SN	offset
61	29766	0.362
62	29766	0.367
63	29766	0.373
64	29766	0.379
65	29766	0.385
65a	29766	0.387
66	29766	0.391
66a	29766	0.393
67	29766	0.396
67a	29766	0.399
68	29766	0.402
68a	29766	0.405
69	29766	0.408
70	29766	0.414
71	29766	0.419
72	29766	0.426

Conductivity Corrections: The Sea-Bird conductivity sensors are found to have a drift rate which is a linear function of time and conductivity. For each cruise the calibration history is used to determine monthly drift rates which are applied to the most recent calibrations. The corrected conductivity measurement C_c, is given by:

$$C_c = C_u + t(C_s C_u + C_o)$$

Where:

C_u	=	uncorrected *in situ* conductivity(S m^{-1})
t	=	time from most recent calibration (months)
C_s	=	slope correction (m^{-1})
C_o	=	offset correction (S m^{-1} $month^{-1}$)

Table 5. - Static Corrections for Conductivity Sensor

Cruise #	SN	Offset Months	Offset (S/m/month)	Slope (/ month)
61	669	6	0	-4.337e-5
62	669	7	0	-4.337e-5
63	669	8	0	-4.337e-5
64	669	9	0	-4.337e-5

65	760	0	0	0.000e+0
65a	760	0	0	0.000e+0
66	760	0	0	0.000e+0
66a	760	0	0	0.000e+0
67	760	0	0	0.000e+0
67a	760	0	0	0.000e+0
68	760	0	0	0.000e+0
68a	760	0	0	0.000e+0
69	760	0	0	0.000e+0
70	760	0	0	0.000e+0
71	669	3.5	0	5.344e-5
72	669	4	0	5.344e-5

The conductivity cell is calibrated against samples taken from the Niskin bottles during the upcast. Typically we have 36 samples ranging from 0-4200m. The discrete samples are measured for salinity on a Guildline 8400A autosal. The conductivity is back-calculated from the salinity value and then matched to the corresponding in-situ conductivity reading. A 3 s average prior to the Niskin closure is used for the in-situ value. These matched pairs from all casts for each particular cruise are grouped together to produce a single equation for the field correction. The deviation between the CTD and bottle value is modelled as a polynomial expression given by:

$$\Delta C = \sum_{i=0}^{n} a_i C_c^i$$

Where:

ΔC	=	Discrete conductivity - CTD
C_c	=	*in situ* conductivity (S m^{-1})
a_i	=	regression coefficients

The corrected continuous CTD conductivity (C) is then given by:

$$C = C_c + \Delta C$$

The order of the polynomial is modified to provide the best fit for the lowest order polynomial. The best fit is determined from the RMS value and a graphical examination of the residuals. The polynomial is usually linear or quadratic. The corrected conductivity and temperature are then used to calculate a calibrated salinity (PSS - 78). The residuals between CTD calculated salinity and bottle salinities are typically less than 0.0015 PSU (see Table 6).

Table 6. - Empirical Field Calibration Coefficients for Conductivity Sensor

Cruise #	SN	RMS	a_0	a_1	a_2	a_3
61	669	1.300E-03	-5.610E-03	2.940E-03		
62	669	9.400E-04	-9.270E-04	3.520E-03		
63	669	1.500E-03	-4.910E-04	3.890E-03		
64	669	2.300E-03	-6.090E-04	4.400E-03		
65	760	7.000E-04	-8.730E-03	4.640E-03	-4.970E-04	
65a	760	7.230E-04	-6.630E-03	3.540E-03	-3.550E-04	
66	760	6.990E-04	-8.560E-03	4.730E-03	-5.020E-04	
66a	760	1.100E-03	-3.400E-03	2.020E-03	-1.540E-04	
67	760	1.400E-03	-5.280E-03	3.160E-03	-3.040E-04	
67a	760	1.300E-03	-1.010E-03	1.100E-03	-5.600E-05	
68	760	9.500E-04	-2.410E-03	1.740E-03	-1.300E-04	
68a	760	1.600E-03	-6.390E-03	1.890E-03		
69	760	1.200E-03	-3.040E-03	2.080E-03	-1.630E-04	
70	760	1.100E-03	-1.650E-02	1.160E-02	-2.390E-03	1.710E-04
71	669	1.400E-03	-6.780E-05	-2.620E-04		
72	669	9.300E-04	-1.070E-02	6.300E-03	-1.470E-03	1.040E-04

Notes to Table 6:

BATS65a: Conductivity residuals were modeled using BATS65a salts above 250m and BATS65 salts below 250m.

BATS66a: Conductivity residuals were modeled using BATS 66a salts above 250m and BATS66 salts below 250m.

BATS67a: BATS 67a salts were combined with Hydrostation 765 salts for modelling the conductivity residuals.

Oxygen Corrections: There are 36 pairs of discrete oxygen samples from 0-4200 meters. These oxygen samples from the upcast are mapped to the downcast at the temperature of the Niskin closure. These matched pairs from all associated casts are grouped together to determine a single equation for each cruise, for the complete depth range. The wet oxygen values are regressed against pressure, oxygen temperature, oxygen current and oxygen saturation such that the CTD oxygen is directly predicted by:

$$MO = 300\left(R_0 + \sum_{i=1}^{l} A_i\left(\frac{P}{4300}\right)^i + \sum_{i=1}^{m} B_i\left(\frac{OT}{30}\right)^i + \sum_{i=1}^{n} C_i(\mathrm{OC})^i + \sum_{i=1}^{o} D_i\left(\frac{OS}{300}\right)^i \right)$$

Where:

MO	=	model CTD oxygen
R_0	=	linear offset
P	=	pressure (dbar)
OT	=	oxygen temperature (°C)
OC	=	oxygen sensor current (μA)

$OS\ (T,p,S)$	=	oxygen saturation value at measured temperature, salinity and pressure (µmol kg^{-1})
A_i, B_i, C_i, D_i	=	regression coefficients
l, m, n, o	=	order of the polynomial functions (1 = 3, rest usually = 2)

The order of the polynomial type expressions is determined by comparing successive fits until correlation coefficients stabilize and the residuals become randomly distributed. Typically l, m, n=2 and o=1. The RMS value between the modelled downcast CTD oxygen and wet oxygen is typically less than 2 µmol/kg.

Table 7. - Empirical Field Calibration Coefficients for Oxygen Sensor

Cruise #	SN	RMS (µmol/kg)	R_0	A_1	A_2	B_1	B_2	C_1	C_2	D_1	D_2
61	13153	1.604	-7.525E-01	4.603E-01	-1.794E-01	-7.761E-01	3.788E-01	2.468E+00	-1.028E+00	8.688E-01	
62	13153	1.8597	-2.249E+00	5.180E-01	-1.729E-01	-1.077E+00	4.130E-01	1.925E+00	-6.187E-01	5.372E+00	-2.818E+00
63	13153	1.7897	-1.330E+00	2.990E-01	-7.518E-02	-1.177E+00	5.353E-01	1.995E+00	-7.929E-01	3.276E+00	-1.575E+00
64	13153	0.9701	-3.216E-03	3.716E-01	-1.236E-01	-8.565E-01	1.397E-01	2.269E+00	-1.114E+00	2.557E-01	
65	13153	1.1968	-2.938E-01	4.088E-01	-1.552E-01	-8.503E-01	2.997E-01	2.258E+00	-1.058E+00	5.097E+00	
65a	13153	1.0016	-3.403E-01	2.492E-01	-6.733E-02	-1.045E-01	5.659E-01	2.255E+00	-1.109E+00	6.323E-01	
66	13153	0.7266	-5.895E-01	3.399E-01	-9.866E-02	-7.489E-01	3.359E-01	2.327E+00	-1.101E+00	7.755E-01	
66a	13153	0.7007	-8.068E-01	2.990E-01	-8.427E-02	-8.412E-01	5.728E-01	2.397E+00	-1.178E+00	9.909E-01	
67	13153	1.3708	-2.879E-01	1.902E-01	-3.532E-02	-1.078E+00	6.305E-01	2.176E+00	-1.105E+00	6.276E-01	
67a	13153	1.6744	-5.160E-01	1.588E-01	-1.168E-02	-1.157E+00	8.324E-01	2.418E+00	-1.359E+00	8.117E-01	
68	13153	1.6796	-6.808E-01	4.013E-01	-1.565E-01	-8.585E-01	5.265E-01	2.351E+00	-1.158E+00	8.531E-01	
68a	13153	1.0022	-1.046E+00	1.285E+00	-9.646E-01	-4.955E-01	3.511E-01	2.565E+00	-1.178E+00	8.764E-01	
69	13153	1.9276	-6.999E-01	3.790E-01	-1.535E-01	-8.665E-01	5.543E-01	2.274E+00	-1.118E+00	9.044E-01	
70	13153	2.3072	-1.186E+00	6.445E-01	-2.566E-01	-2.973E-01	-7.866E-02	2.674E+00	-1.112E+00	1.097E+00	
71	23244	1.7623	-3.826E-01	3.298E-01	-1.146E-01	-8.695E-01	3.591E-01	2.400E+00	-1.341E+00	7.341E-01	
72	13153	1.2141	-7.909E-01	4.374E-01	-1.602E-01	-6.108E-01	2.394E-01	2.171E+00	-9.614E-01	9.295E-01	

Notes to Table 7:

BATS65a: Oxygens were modeled using BATS65a oxygens above 250m combined with BATS65 oxygens below 250m.

BATS66a: Oxygens were modeled using BATS66a oxygens above 250m combined with BATS66 oxygens below 250m.

BATS67a: Oxygens were modeled using BATS67a oxygens above 260m combined with BATS67 oxygens below 250m.

BATS68a: Oxygens were modeled using a combination of BATS 68a oxygens with Hydrostation 767 oxygens.

Transmissometer Calibration: The transmissometer shows frequent offsets in deep water which indicate variations in its performance. The theoretical clear water minimum beam attenuation coefficient (BAC) is 0.364 (Bishop, 1986). We assume that the minimum BAC value observed at the BATS site in the depth range 3000-4000 m is representative of a clear water minimum. We equate this minimum value with the theoretical minimum to determine an offset correction. The correction is given by:

$$\text{offset} = 0.364 - \text{BAC}_{\text{min}}$$

where BAC_{min}=minimum value for 3000 m<depth<4000 m. This offset is applied to the entire profile.

The Sea Tech transmissometers used on these cruises have had a series of problems, some of them associated with component failures on the deeper casts. Other problems are associated with the temperature compensation unit in the transmissometer. These temperature related problems give rise to a variety of suspect behaviors: high surface values (well beyond normal) that correlate with the time of day (highest at noon); exponential decay within and below the mixed layer; linear or exponential decays in the permanent thermocline; and high cast to cast variability, even in deep water. As a result of these problems, some beam attenuation profiles are only good to certain depths. This depth is usually in the upper thermocline which does not allow us to compare the minimum in the profile with the theoretical clear water minimum. For these cases we choose a depth to which we believe the profile to be good and then compare this with the historical mean profile. The offset is then calculated at this depth and applied to that portion consider to be acceptable. The rest of the profile is designated as bad and set to -9.990.

Table 8. - Beam Attenuation Coefficient Offset Corrections

Cruise #	SN	# Casts reported	Offset (/ m)	Max Depth (m) of good data
61	184D	1-5	-0.207	4200
62	184D	1-8	-0.199	4200
63	266	2-7	0.007	500
64	266	1-6,9,10	-0.021	500
65	266	1,2,4-9	-0.024	500
65a	266	1-4	-0.026	500
66	184D	1-7	0.026	4200
66a	184D	1-7	0.026	500
67	184D	1-11	0.017	4200
67a	184D	1-5	-0.004	500
68	184D	1-9	0.029	4200
68a	184D	1-2	0.026	200
69	184D	1-10	0.020	4200
70	184D	1-9	-0.012	4200
71	184D	1-9	-0.073	4200
72	184D	1-9	-0.122	4200

The ability to distinguish between genuine patterns and instrument problems can be difficult and should be treated with caution.The beam attenuation data should be considered qualitative and no attempt should be made to compare absolute numbers from one cruise to another.

Fluorometer Calibration: The fluorometer returns a voltage signal that is processed by the Seasoft software to a chlorophyll concentration. There is a standard instrument offset which is determined from the voltage reading on deck with the light sensor blocked off.

There is a "scale factor" which is determined for each chlorophyll range. The BATS fluorometer is scaled to read chlorophyll from 0 -1.5 µg/l. Previous data reports have documented a field offset which is applied to the fluorometry data. We now believe this offset to be inappropriate and do not perform such a correction.

Final Data Format: Once all corrections have been applied the data are compared graphically against historical data envelopes. In particular, the modelled salinity and dissolved oxygen are plotted against potential temperature to ensure that no distortions to the profiles have been introduced as a result of the regression type modelling. The downcast data are then averaged in 2 dbar bins, ready for dissemination. A descriptive header containing relevant cast information is appended to the top of the 2dbar data.

Dissolved Oxygen by the Winkler Procedure

Shipboard Sampling

For all casts the oxygen sample is the first sample drawn from the Niskin bottle. These samples are taken as soon as possible after the CTD rosette returns to the surface, typically within 5-15 minutes of recovery. The oxygen samples are drawn into Pyrex® iodine determination flasks of 140 ml nominal capacity with ground glass barrel stoppers. When obtaining the water sample great care is taken to avoid introducing air bubbles into the sample. A 30–50 cm length of Tygon® tubing is connected to the Niskin bottle spout. The end of the tube is elevated before the spout is opened to prevent the trapping of bubbles in the tube. With the water flowing, the tube is placed in the bottom of the horizontally held sample flask in order to rinse the sides of the flask and the stopper. The flask is turned upright and four to five volumes of water are allowed to overflow from the flask. The tube is then slowly withdrawn from the sample flask while water is still flowing. Immediately after obtaining the seawater sample, the following reagents are introduced into the flask by submerging the tip of a pipette or automatic dispenser well into the sample: 1 ml of manganous chloride, followed by 1 ml of sodium iodide-sodium hydroxide solution. The stopper is carefully placed in the bottle ensuring that no bubbles are trapped inside. The bottle is vigorously shaken, then reshaken approximately 20 minutes later once the precipitate has settled to the bottom of the bottle. If there are replicates to be taken from a Niskin, they are drawn immediately following the first sample. For BATS 61 through 72 oxygens were replicated at every depth.

Once all oxygen samples from a particular Niskin have been drawn, the temperature of the water from the Niskin is measured and recorded. Sample bottles are stored upright in a cool, dark location and the necks water sealed with saltwater. These samples are analysed after a period of at least 6-8 hours but within 36 hours.

Sample Analysis

The chemical determination of oxygen concentrations in seawater is based on the method first proposed by Winkler (1888) and modified by Strickland and Parsons (1968). The basis of the method is that the oxygen in the seawater sample is made to oxidize iodine ion to iodine quantitatively; the amount of iodine thus generated is determined by titration with a standard thiosulfate solution. The endpoint is determined by the absorption of ultraviolet light by the tri-iodide ion. The amount of oxygen originally contained in the

sample can then be computed from the titer: one mole of O_2 reacts with four moles of thiosulfate.

The analysis technique is based on the Carpenter (1965) modification of the traditional Winkler titration, and uses an automated titration system designed by Robert Williams (Scripps Institute of Oceanography). The key components of the auto-titrator are a thiosulphate delivery system (Metrohm 665 Dosimat), an ultra-violet light source and a UV detector. Initially the Dosimat rapidly dispenses thiosulfate into the sample. As changes in UV absorption decrease, the rate is slowed, and finally the continuous addition stopped. The endpoint is then approached by adding ever smaller increments of thiosulfate until no further change in absorption is detected, indicating that the endpoint has been passed. The actual endpoint volume is determined by analysis of the data points around the inflection point of the titration curve. The within-sample precision is typically better than 0.01ml/l.

Dissolved Inorganic Carbon

Shipboard Sampling

Samples for dissolved inorganic carbon (DIC), also known as total carbon dioxide (TCO_2), are collected after the oxygen samples. Samples are drawn into individually numbered, clean 1 liter borosilicate glass bottles. In obtaining seawater sample, care is taken to minimize turbulence and to prevent the retention of air bubbles in the bottles. A 30-50 cm length of Tygon tubing is connected to the Niskin bottle spout. The end of the tube is elevated before the spout is opened to prevent the trapping of bubbles in the tube. With the water flowing, the tube is placed in the bottom of the bottle. The bottle is slowly rotated and the sides of the bottle tapped with the stopper to ensure that no air bubbles adhere to the bottle walls. At least two to three volumes of water are allowed to overflow from the bottle. A headspace of >1% of the bottle volume is left to allow for water expansion. Two hundred microliters of saturated mercuric chloride are added to the sample bottle in order to prevent further biological activity. The bottle neck is dried with a Kim-Wipe stick and then tightly sealed ensuring that it remains gas-tight. Rubber bands are placed around the lip of the bottle and the stopper in a criss-cross manner as positive closure of the bottle. Samples are stored in a cool, dark location until analysis.

Sample Analysis

Total carbon dioxide is measured with a high precision semi-automatic coulometric technique following guidelines proposed by D.O.E. and U.N.E.S.C.O. (D.O.E., 1991, U.N.E.S.C.O., 1991). Samples are acidified, converting HCO_3^- and CO_3^{2-} to undissociated CO_2, which is then extracted as a gas, trapped and titrated coulometically (Johnson et al., 1987). A high degree of precision and accuracy is maintained in our laboratory by using a SOMMA (Single-Operator Multiparameter Metabolic Analyzer) designed by Ken Johnson of Brookhaven National Laboratory and copyrighted by the University of Rhode Island. This apparatus is coupled to a commercial UIC coulometer that detects extracted CO_2. The measurement is calibrated with pure CO_2. Within-bottle precision is 0.3 µmol/kg, and between-bottle precision is 0.5 µmol/kg, well within proposed guidelines (D.O.E., 1991).

Salinity

Shipboard Sampling

Salinity samples are collected into individually numbered 125 and 250 ml borosilicate glass bottles. Sample remaining from the previous cruise is left in the bottles between uses to prevent salt crystal buildup from evaporation. When drawing a new sample, the old water is discarded and the bottle is rinsed three times with new sample. After the third rinse, the bottle is filled to the shoulder with sample. The neck of the bottle and inside of the cap are dried with a Kimwipe. The cap is replaced and firmly tightened. Every six months, the bottles are acid washed (1 M HCl), rinsed with deionized and Milli-Q water and filled with Milli-Q. After this cleaning they are rinsed five times with copious amounts of sample before filling on the next cruise.

Sample Analysis

The samples are analyzed on a Guildline AutoSal 8400A laboratory salinometer using the manufacturer's recommended techniques. The salinometer is calibrated with IAPSO standard seawater. For BATS 61-70, IAPSO standard seawater from batch p123 was used while for BATS 71 and 72, IAPSO batch p124 was used. Two standards are run prior to running the samples. If the two standards agree, the samples are run. At the end of the run two new standards are measured to check for instrument drift. Drifts are generally found to be zero. Sample precision as determined from replicates is less than 0.001.

Nutrients

Nutrients routinely measured at all depths include: nitrite, nitrate+nitrite, orthophosphate and reactive silicate. Samples were initially collected for ammonia, however because the results were always at or well below the detection limits of the method and contamination problems were present, this measurement was discontinued.

Contamination is a major problem with nutrient samples, particularly in the upper ocean where the ambient concentrations are low. All the nutrient bottles are rigorously cleaned before use. The cleaning begins by a wash with a phosphate-free detergent (Aquet) followed by a rinse with 10% HCl, three rinses with deionized water and a final rinse with Milli-Q water.

Shipboard Sampling

Samples are collected in triplicate into 60 ml amber bottles (Nalgene HDPE) at all 36 depths between the surface and 4200 m. Additional replicate samples are taken from four to six deep water depths. Samples are collected by gravity filtration through an in-line filter (0.8 μm Nuclepore) connected directly to the Niskin bottle. Each sample bottle is rinsed three times with approximately 15 ml of sample and then filled two-thirds full. One set of samples is transferred to a refrigerator (4°C) and kept cold until analyzed for reactive silicate, while the other two sets are transferred to a freezer (-20°C) and kept frozen until the analysis for nitrite, nitrate+nitrite and phosphate can be conducted. The second set of frozen samples acts as a back-up sample set. Deep water replicates from the second set (the back-ups) are stored to be run with the next cruise samples as a check on run-to-run and deep water sample variability.

Sample Analysis

The automated methods for the determination of nitrite, nitrate + nitrite, phosphate and reactive silicate use continuous flow analysis performed on the Technicon AutoAnalyzer II System. These methods are suitable for assays of oceanic nutrient levels (e.g. LOD of 0.005 µmol/kg for nitrite, 0.05 µmol/kg for nitrate+nitrite, 0.03 µmol/kg for phosphate and 0.2 µmol/kg for reactive silicate). The automated photometric determination of nitrite and of nitrate+nitrite in sea water uses the method of Oudot and Montel (1988) and Raimbault *et al.* (1990).

Nutrient analysis is carried out in three separate runs. Reactive silicate (unfrozen) is run within a week of sample collection. The remaining nutrients (frozen) are run within two months of collection, on two separate runs (high and low sensitivity settings). Each run has a discrete set of standard calibration settings in order to maximize sensitivities within each range of expected values.

The photometric determination of nitrite and nitrite+nitrate in sea water is based on the reaction of nitrite with an aromatic amine (i.e. sulfanilamide), resulting in the formation of a diazonium compound. This is then coupled with a second aromatic amine (NEDA) to yield a red azo dye. Determination of nitrate+nitrite is accomplished with the same procedure as nitrite after the reduction of nitrate to nitrite by passing the sample stream through a column of copperized cadmium.

The photometric determination of phosphate in sea water is based on the fomation of a phosphomolybdenum blue complex. Ammonium molybdate reacts with phosphate to give phosphomolybdic acid. This in turn reduced with ascorbic acid to phosphomolybdous acid, yielding a blue color.

The photometric determination of reactive silicate is based on the formation of a silicomolybdenum blue complex. The sample is reacted with ammonium molybdate in a dilute acid to form silicomolybdic acid, which is then reduced to silicomolybdous acid using stannous chloride as the reductant. This method is non-linear at high silicate concentrations and its color yield is sensitive to environmental temperature fluctuations. Temperature at the reaction coils are monitored for change throughout a run, and reaction coils are insulated from drafts.

Particulate Organic Carbon and Nitrogen

Shipboard Sampling

Water for the measurement of suspended POC and PON is collected at all depths between 1000 m and the surface, typically within 30 to 60 minutes of CTD recovery. Samples are collected in 4 liter polypropylene bottles equipped with a 1/4 inch outlet at the base and are filtered in-line using filters mounted in Delrin filter holders. Each holder is connected to the outlet at the bottom of the 4 liter bottle on one end and a vacuum system (liquid container and pump) on the other. Two liters are filtered at all depths from surface to 1000 m onto precombusted 25 mm Whatman GF/F filters (nominal pore size 0.7 µm). The filter is removed, wrapped in precombusted aluminum foil and stored in a freezer (-20°C) until processed back on shore.

Sample Analysis

Prior to analysis, the filters are thawed, allowed to dry overnight at 65°C and then placed overnight in a desiccator saturated with HCl fumes. The air in the desiccator is kept saturated due to the presence of concentrated HCl in an open container in the lower compartment of the desiccator. Thereafter, the filters are dried again at 65°C and packed in precombusted (850°C, 1 hour) Nickel sleeves.

The samples are analyzed on a Control Equipment Corporation (CEC) 240-XA Elemental Analyzer following the guidelines given by the manufacturer. Sixty-four samples are held by the autosampler, of which one is a standard (see below) and approximately nine are Ni sleeve blanks. Data are automatically collected and stored onto a microcomputer.

Acetanilide standards and blanks (empty Ni sleeves) are measured prior to each batch run of samples. Three clean filters soaked in filtered seawater and processed as an ordinary sample are analyzed for each cruise as a filter blank. The acetanilide standard is weighed on a Perkin-Elmer Electrobalance in tin capsules cleaned with chloroform and acetone and combusted. Standard weights are usually between 0 and 2.0 mg. The tin capsule with standard is then put in a precombusted Ni sleeve and run on the Elemental Analyzer. Acetanilide has 0.7109 g C and 0.1036 g N per g total mass.

We use precombusted 25 mm Whatman GF/F filters to estimate blank carbon and nitrogen from the handling of filters outside the actual filtration. These blanks contain approximately 6-12 µg C/filter (corresponds to 3-6 µg C/l) and 0.3-1.6 µg N/filter (corresponds to 0.15-0.80 µg N/l). This variability in the blank represents a large uncertainty in the magnitude of deep water CHN values where the size of the signal is often only twice the blank value. The largest problems resulting from this blank uncertainty are that the C:N ratios likely come from too high of a carbon blank compared to the size of the nonfiltered carbon that is actually on the filter or from too low of a nitrogen blank for that filter. Individuals who desire to use the POC and PON data for analyses of C:N ratio variability should contact BATS personnel for the raw data and make their own decisions regarding the treatment of blanks.

Phytoplankton Pigments

Shipboard Sampling

From one of the shallow CTD casts on each cruise pigments are sampled from 12 depths between the surface to 250 meters. The depths are selected to correspond with the major features in the *in vivo* fluorescence profile collected on a previous cast with the *in situ* fluorometer on the CTD. Water samples are collected from Niskins into clean 4 liter polyethylene bottles with Tygon tubing. Samples (4.0 l) are immediately filtered through 47 mm GF/F filters using polycarbonate in-line filter holders (Gelman) and a vacuum of less than 100 mm Hg. Filters are folded in half twice and wrapped in aluminum foil, labeled, and placed in liquid nitrogen for storage. Storage time is kept as short as possible. Samples collected for HPLC analysis are also used in the measurement of chlorophyll *a* and phaeopigments by fluorometric analysis.

Sample Analysis - HPLC Methods

After removal from the liquid nitrogen the filters are extracted in 5.0 ml of 100% acetone. The 800 µl of retained water on the filter will adjust the final extraction solution to 86% acetone. The samples are sonicated in an icewater bath for 10 min and then let to extract overnight in the freezer (-20°C). Following extraction, samples are vortexed and spun down in a centrifuge for 10 minutes to remove debris.

After centrifuging, 1000ul of sample are combined with 400ul of Milli-Q water and let stand for 5 minutes before injection. Approximately 1 ml of the dilluted sample is injected into the 500 µl sample loop and a multi-step solvent program is initiated on closure of the injection valve . For BATS 61-69 a 2 solvent program was used with eluent A (80:15:5 MeOH:Milli-Q water: IPA) and eluent B (100% MeOH) with a flowrate of 6 ml/min. Starting with BATS 70, the method was updated to a modified version of Wright et al. (1991), provided by Bidigare (in press). This method is a 3 solvent program with eluent A (80:20, v:v, methanol: 0.5 M ammonium acetate, aq., pH=7.2), eluent B (90:10, v:v, acetonitrile:water), and eluent C (ethyl acetate) pumping at a rate of 1 ml/min. This method not only uses less solvent than the previously used method but also gives better peak separation and better resolution at lower concentrations. An overlap of the methods for 4 cruises led for a successful transition comparison. The chromatogram is collected on a MacIntegrator software package. The identities of the peaks from the sample extracts are determined by comparing their retention times with those of pure standards.

Concentration of the individual pigments in the sample are calculated using the following formula:

$$C_i = A\,(RF)\;(1/IV)\;(EV)\;(1/SV)\,IS$$

Where:

C_i	=	individual pigment concentration (ng/liter)
A	=	integrated peak area
RF	=	standard response factor
IV	=	injection volume (0.5 ml)
EV	=	extraction volume (5.8 ml) with internal standard correction
SV	=	sample volume
IS	=	correction for internal standards if used

Sample Analysis - Fluorometric Analysis of Chlorophyll *a* and Phaeopigments

A 1 ml aliquot of the extract from the sample used for HPLC analysis is combined with 4 ml of 90% acetone and used for fluorometric analysis. The fluorometer is zeroed with 90% acetone and the samples are read using a door setting that produces a dial reading between 30 and 90. The reading is recorded and a second reading is taken after the sample is acidified with two drops of 1.2 N HCl. The fluorometer is zeroed each time the door setting is changed. Further dilutions may be necessary for higher concentrations.

The concentrations of chlorophyll *a* and phaeopigments in the sample are calculated using the following equations:

$$Chla = (T/(T-1))\,(Rb-Ra)\,Fd\,(vol_{ex}/vol_{filt})$$

$$Phaeo = (T/(T-1))\,((TRa)-Rb)\,Fd\,(vol_{ex}/vol_{filt})$$

Where:

T	=	acidification coefficient (Rb/Ra) for pure Chl *a* (usually 2.2).
Rb	=	reading before acidification.
Ra	=	reading after acidification
Fd	=	door factor from calibration calculations
vol_{ex}	=	extraction volume in ml (5.8 ml).
vol_{filt}	=	sample volume in l (4.0 l)

The fluorometer is calibrated every 6 months with a commercially available chlorophyll *a* standard (*Anacystis nidulans*, Sigma Chemical Company).

Bacterioplankton Abundance

Shipboard Sampling

Samples for bacteria enumeration are collected at 18 depths between the surface and 4000 m (all 12 depths from 0-250 meters and 6 depths between 300 and 4000 meters). The samples (90 ml) are measured into a graduated cylinder, then transferred into 125 ml high-density polyethylene bottles. Both the graduated cylinder and the sample bottle are rinsed three times. Immediately following collection, the samples are preserved with 10 ml of 20% particle-free (0.2 µm filtered) glutaraldehyde, and stored in the dark at 4°C.

Sample Analysis

A sample volume necessary to yield 50-100 cells per field of view (total volume always more than 5 ml) is filtered onto a 0.2 µm Nuclepore filter prestained with Irgalan Black. Uniform cell distribution is obtained by using a Whatman GF/D support filter soaked in a Manostat Aquet laboratory detergent solution. After filtration, the filter is covered with approximately 1 ml of the DAPI solution (100 µg/ml), and left to stain in the dark. After 5-10 minutes, the DAPI is filtered off and the Nuclepore filter is immediately mounted on a slide using Zeiss Immersion oil 518C (n_e=1.518). The stained bacteria are stored frozen and counted within 2 days.

Fifteen fields or a total number of 900 stained bacteria are counted to verify even distribution on the filter. Bacteria are distinguished by distinct morphologies which brightly fluoresce; fluorescing images less than 0.2 µm in diameter are disregarded.

Primary Production

The primary production measurement is a modification of the trace-metal clean techniques suggested by Fitzwater *et al.* (1982). Rigorous efforts are made to prevent contamination of the samples. Polycarbonate 250 ml bottles are used for productivity incubations. New bottles are soaked for 72 hours in a 5% solution of Micro detergent. Bottles are then rinsed thoroughly with tap water, and subsequently soaked for 72 hours in 0.5 N HCl. The bottles are rinsed 3 times with Milli-Q water and then soaked in Milli-Q for at least 48 hours. Once a new bottle has been cleaned as described above, between cruise cleaning consists of soaking for 24 to 48 hours in the acid cleaning solution and rinsing 3 times with Milli-Q.

The ^{14}C sodium bicarbonate (aqueous, specific activity 1 mCi/ml, 5 mCi lots) is purchased from ICN Biomedical. A sodium carbonate solution is prepared by dissolving 0.15 g in 500 ml Milli-Q water. A clean teflon bottle is rinsed with the carbonate solution. In the teflon bottle, the ^{14}C stock is diluted to a working solution (5.0 ml stock diluted to 67 ml with carbonate solution, final specific activity = 80 µCi/ml) and refrigerated (4°C) until use.

Shipboard Sampling

Eight standard depths at 20 m intervals from 0 to 140 m (light levels of 95%-0.6%) are sampled. Several hours before sunrise, seawater samples are obtained using 12 liter Go-Flo bottles hung from a Kevlar line with a plastic wrapped weight secured to the end. All eight bottles are lowered to respective depths and triggered with brass messengers. To limit contamination polyethylene gloves are worn during the handling of bottles.

Shipboard Processing

Productivity samples are drawn directly from the Go-Flo bottle into 250 ml polycarbonate flasks under low light conditions. A total of five flasks are filled from each depth (three light samples, one time zero and one dark sample), each flask being rinsed three times prior to filling. Under low light conditions, 250 µl of the ^{14}C working solution (20 µCi) is added to each flask using an acid cleaned polypropylene pipet tip.50 ml from one flask from each depth is immediately filtered as a time zero. A second flask from each depth is wrapped in aluminium foil and placed in a dark cloth bag for use as a dark productivity sample. The dark bottle and remaining three 'light' bottles are hooked together with a combination of plastic electrical tie wraps and a length of bungi cord. Each bungi cord is secured to the production array line at appropriate depth, and approximately one hour before sunrise the in situ production array is deployed. Time and position of deployment are recorded. Approximately 0.5 hours after sunset the productivity array is recovered. Filtration begins as soon as the array is secured on deck. Maintaining low light conditions, a 50 ml aliquot is drawn from each productivity bottle using a 50 ml plastic syringe. This aliquot is filtered onto a 25 mm Whatman GF/F glass fiber filter maintaining vacuum levels of 70 mm Hg or less. Filters are placed in a 20 ml glass scintillation vial, covered with 250 µml 0.5 N HCl, and held at room temperature until subsequent processing on shore.

Additionally, two 250 µl aliquots are drawn from each depth for counting total added ^{14}C activity. The first aliquot is taken from the time zero flask, the second at random from one

of the light flasks at the end of the incubation period. The aliquots are placed in separate 20 ml glass scintillation vials each containing 250 µl ethanolamine. The mixture is held at room temperature until subsequent liquid scintillation analysis on shore.

Sample Analysis

At a shore laboratory, the productivity sample vials are uncapped in a fume hood and allowed to dry overnight. A 10 ml aliquot of liquid scintillation cocktail (Aquasol) is added to the dried filters. For measuring total activity, 10 ml of liquid scintillation cocktail plus 2.5 ml Milli-Q water are added to the vials containing the 250 µl sample and 250 µl ethanolamine. The mixture is shaken vigorously and left at room temperature for 2 days before liquid scintillation counting.

Samples in liquid scintillation cocktail are counted for 4 minutes in a Packard Tri-Carb 2000CA Liquid Scintillation Analyzer. An external gamma source is used to assess quenching of individual filter samples for conversion of counts per minute (CPMs) to disintegrations per minute (DPMs). The Packard analyzer uses a proprietary method to mathematically transform the raw Compton spectrum generated in the scintillation cocktail by the external source. This procedure minimizes distortions due to wall and volume dependent effects which can vary from sample to sample. Quenching of the total radioactivity vials is determined by internal standard.

$$Production\,(mgC/m^3/d) = (SDPM/V)\,W\,(0.25 \times 10^{-3}/TDPM)\,1.05$$

Where:

SDPM	=	DPMs of sample
TDPM	=	Total ^{14}C DPMs (in 0.25 ml)
V	=	volume of filtered sample in liters (usually 0.05 l)
W	=	25000 mg C m^{-3} (estimated mass of carbon in sea-water)

This calculation is made for each light, dark and time-zero bottle. The dark bottle rate is subtracted from the light bottles to correct for non-photoautotrophic carbon fixation or adsorption.

Determination of Bacterial Growth Using Methyl Tritiated Thymidine

Shipboard Sampling

Eight standard depths at 20 m intervals from 0 to 140 m (light levels of 95%-0.6%) are sampled. Water for the ^3H-thymidine incubation is taken from the Go-Flo bottles after the sampling for the primary production measurements. Polyethylene gloves are worn during sampling to prevent contamination. Samples of 29ml are drawn directly from the Go-Flo bottle into polycarbonate centrifuge tubes under low light conditions. A total of three tubes are filled from each depth, each tube being rinsed three times prior to filling.

Shipboard Processing

Under low light conditions 100 µl of the working tritiated thymidine solution (stock solution: Amersham, 60-90 Ci mmol^{-1} *thymidine*) is added to each tube resulting in a 10 nM final concentration. The tubes are placed into a rack and submerged in surface seawater in a dark cooler for an incubation of 1-2 hours.

After the incubation is started, time zero samples are filtered from additional triplicate aliquots of 20 ml of seawater from 100m. The aliquots are terminated by adding 200µl of concentrated (37%) formalin, followed by the addition of 50µl of tritiated thymidine working solution. The solutions are immediately filtered and extracted (see below).

The incubation is ended by pouring aliquots of 20 ml from each tube into ice-cold graduated polyethylene centrifuge tubes containing 200 µl of concentrated (37%) formalin. The aliquots are filtered and extracted immediately.

Prior to filtration, filters are soaked for at least an hour in 5% TCA. Under low light conditions, samples are filtered onto pre-soaked 25 mm MFS cellulose nitrate filters (0.2 µm) maintaining a vacuum of 70 mm Hg or less. The centrifuge tubes are rinsed with 10 ml of a 5% TCA solution, which is added to the filter. The filter funnel is then rinsed with 10 ml of pure ethanol. At this time the filter funnel is removed and the filter is rinsed with 3 X 1 ml of the 5% TCA solution and finally 3 X 1 ml pure ethanol. The filter is placed in a 20 ml glass scintillation vial to dry overnight.

Additionally, three 50 µl aliquots from three random incubation tubes are added to a set of three scintillation vials to determine the total amount of label added to the samples.

Sample Analysis

On shore, the filters are let to completely dissolve in 0.5ml of ethyl acetate. At this time, scintillation cocktail (Ultima Gold) is added to each vial making a total volume of 10ml. At this time 10ml scintillation cocktail is also added to the total radioactivity samples. All vials are left overnight and counted the following day on a liquid scintillation counter.

No universal factors exists for the conversion of DPM values into bacterial cell growth or bacterial carbon production (Kirchman *et al.* 1982; Newell and Fallon 1982; Ducklow & Hill 1985; Coveney and Wetzel 1988). Hence, the bacterial growth rate is reported as pmole ^{3}H-thymidine taken up per time unit after adsorption of thymidine (time zero) is corrected for.

$$[methyl-{}^{3}H-thymidine]\ (pmole/l/h) = (DPM/2200)\ (1/SA)\ (1/V)\ (1/T)$$

Where:

DPM	=	disintegrations per minute
V	=	extraction volume (0.02 l)
SA	=	specific activity (60-90 Ci/mmol)
T	=	incubation time (hours)

A check on the final concentration of the tritiated incubation solution is estimated by converting the amount of the measured total activity into the final concentration of tritiated thymidine.

$$[methyl-^{3}H-thymidine]\ (nmol/l) = (DPM/2200)\ (1000/V)\ (1/SA)$$

Where:

V = aliquot taken from incubation solution (50 µl)
SA = specific activity (60-90 Ci/mmol)

Theoretically, the final concentration of the incubation solution can also be calculated given the specific activity (e.g. 60 Ci/mmol) and a working solution of 1 mCi/5ml. The concentration of the 5ml working solution is then 3 µM. With a dilution factor of approximately 1/300 the final concentration of the incubation solution will be 10 nM.

Trap-Collected Particle Flux

The particle collection device central to the Multitraps is a polycarbonate cylinder (PIT) with a cross-sectional collection area = 0.0039 m^2. The cylinder is equipped with a base to hold a 90 mm Nuclepore polycarbonate membrane filter and a PVC drain valve mounted under the base of the filter holder. At the surface of the cylinder, plastic baffling consisting of circular openings 1.2 cm in diameter provide turbulence reduction at the trap opening. A PVC cross with cutouts to fit the PITs allows for mounting of up to 12 PITs at each depth. The cross is secured to the premeasured 1/2 inch polypropylene line by means of U-bolts which clamp onto the line, and by 1/4 inch safety lines secured to the trap line below the cross with hose clamps. The prepared PIT cylinders are held in place on the cross by bungi cord retainers.

At the surface, the polypropylene line is attached to a stainless swivel which is then attached to a stainless steel chain with two 17 inch diameter glass flotation spheres covered by a polyethylene "hard hat" housing. The floats are attached to a 10 m double length of 1/2 inch bungi cord connected to a 5/8 inch double braided Duralon line with 8 orange polypropylene A2 floats. The entire flotation array is secured to the surface spar. The surface spar consists of a styrofoam core float with a central mast on which is mounted a VHF radio beacon (Novatech), strobe light (Novatech), and ARGOS transmitter.

At BATS we usually deploy an Aanderaa RCM-current meter at 160 m depth. This instrument records time, pressure, temperature, flow speed and flow direction. It records a vector average flow speed and direction at one minute intervals and records the instantaneous measurements every minute for the other parameters. In previous experiments we have deployed a custom-built hydrodynamic sensing package (HDS) that uses microsensing flowmeters based on the hot-wire principle. These packages record flow at four locations on the trap array at 5 Hz plus a variety of other hydrographic parameters (Gust *et al.*, 1994). The current meter data will be presented in a seperate report.

Cleaning and Preparation

Before using for PITs, poretics polycarbonate membrane filters (90 mm diameter, 0.8 μm pore size) are soaked overnight in 1.2 N HCl (Baker Instra-Analyzed), rinsed with 1.2 N HCl, rinsed three times with Milli-Q water, and then put in individual plastic petri dishes. The cleaned filters are oven dried (65° C for a couple of days), allowed to cool in a desiccator, and tared to constant weight on an analytical balance (Sartorius R160P). The porous polyethylene filter frit is rinsed in Milli-Q, soaked for 24 hours in 1.2 N HCl, and rinsed with Milli-Q three times. All other trap parts are soaked overnight in a 5% dilution of Aquet Manostat detergent, rinsed thoroughly in tapwater to remove the detergent, soaked 24 hours in 0.6N HCl, and then rinsed in Milli-Q. The PITs are assembled while wearing latex gloves. The prepared Poretics filters are attached to the base of the polycarbonate cylinders together with the porous filter frit and covered by the filter holder with the PVC drain valve. Polyethylene tape is used to provide a leaktight fit of the filter holder to the cylinder. The assembled PITs are stored in plastic bags until used.

A density gradient solution is used to reduce advective-diffusive exchange of trap contents with ambient seawater during deployment. The solution is prepared by adding 1 liter of formalin and 2.5 kg NaCl to seawater yielding a 2% formalin and approximately 86 g/l NaCl solution. The solution is gravity filtered through a 0.5 μm cartridge membrane filter (Millipore). A 1 liter portion of this solution is saved for subsequent processing steps (see below). The PITs are filled with the density gradient solution and covered with a clean plastic cap that is removed prior to deployment.

Shipboard Sampling - Deployment and Recovery

The trap array is deployed for a 72 hour period. Triplicate PITs are deployed at each of three depths (150, 200, 300 m). A non-functioning fourth PIT serves as a counterweight to balance the cross. On recovery, the traps are covered with the plastic caps before they are removed from the cross. The seawater at the top of the trap is siphoned off to the level of the visible density interface using acid-rinsed (0.5N HCl, Baker Instra-Analyzed) Teflon tubing, and the density gradient solution is drained through the bottom of the trap and discarded. The Poretics filter is removed, returned to its petri dish, sealed with Parafilm and labeled. The filters are stored in the refrigerator until analyzed.

Sample Analysis

The "swimmers" (recognizable zooplankton) are removed using forceps under a dissecting microscope (12-25 power magnification). The filters are kept wet during this period by adding small volumes of the retained density gradient solution. The material on the filter is scraped into a bolus at the center of the filter with a scalpel and salts are removed by rinsing with Milli-Q water adjusted to pH 9 with ammonium hydroxide. The filter with the sample bolus is oven dried (65°C), placed in a desiccator and weighed daily until weight is constant for 2 consecutive weighings. This weight minus the tare weight of the filter, divided by the number of days deployed (3) and by the trap cross-sectional area (0.0039 m^2) equals the mass flux (mg/m/d).

Carbon and nitrogen analyses are performed using a Control Equipment Corporation (CEC) 240 XA elemental analyzer calibrated with acetanilide. The bolus is scraped off the

filter with a scalpel and ground in an agate mortar. The whole sample (50-300 µg) is transferred to a silver boat and weighed on a CAHN Electrobalance (Model 4400). The silver boats are put in wells drilled in a Teflon block, and fumed with concentrated HCl for 36 hours to volatilize inorganic carbon. The fumed boats are desiccated overnight and then analyzed for total nitrogen and organic carbon. The results from the C/N analysis yield %C and %N. Particulate flux (mg N or mg C/m^2/d) is then calculated by multiplying the %C or %N by the mass flux.

Unit Conversions

Most of the analytical methods yield values in volumetric units (e.g. µmol/l, µg/l). These data are converted to mass units (e.g. µmol/kg) using the appropriate density of seawater. For oxygen and particulate sampling, the sampled density is calculated from an estimate of the sample temperature at the time it was collected (see below). For nutrients, the density is calculated using the laboratory temperature at the time of analysis.

Oxygen Conversions

The Winkler titration calculations currently in use provide the oxygen concentration in ml/l. These data are converted to units of µmol/kg using the relationship:

$$O_2\,(\mu mol/kg) \;=\; O_2\,(ml/l)\;(C/\rho)$$

Where:

C	=	44.66 µmol O_2/ml O_2
ρ	=	density of sample at the fixation temperature (kg/l)

We use the temperature (Thermolyne® digital Pyrometer) at the time samples are drawn the for calculation of the density of seawater in the conversion from volume to weight units rather than the lab temperature at the time of analysis. Soon after the addition of the Winkler reagents to the cold sample, the precipitate settles to the bottom of the oxygen bottle. As the sample warms to room temperature, the small expansion of the seawater will push a little water past the ground glass stopper. The precipitate is left behind, thus reflecting the oxygen in the slightly larger volume of cold water.

Particle Conversions

The concentrations of chlorophyll *a* and other pigments and particulate organic carbon and nitrogen are converted to mass units using the collection temperature, as described for oxygen. These samples are filtered immediately after collection. The accuracy of the volume measurement is probably only a few percent and the natural variability of replicate samples is on the order of 10-20%.

Nutrient Conversions

Nutrient samples are converted from volumetric to mass units using:

$$Cm\,(\mu mol/kg) = Cv\,(\mu mol/l)\,/\rho$$

Where:

Cm	=	concentration in mass units
Cv	=	concentration in volume units
$\rho(T_L, s)$	=	density (kg/l) of sample at the lab temperature (T_L (°C)) and *in situ* salinity (s).

Ancillary Measurements

In addition to the core BATS measurements a number of ancillary samples were taken on a routine or ad hoc basis. The protocols of these particular measurements are set up in conjunction with the Principal Investigator.

PI	Acronym Descriptor	Description of Project	Cruises Sampled
Siegel, D./ Michaels, A.	BBOP	Measurement of in water light field and associated properties using a spectral radiometer, absorption and transmission meter, and fluorometer to relate to major biogeochemical processes in the Sargasson Sea.	BATS 61 -72 inclusive
Siegel, D./ Michaels, A.	BBOP chl *a*	NASA Calibration Validation Dicscrete chl *a* samples (Turner fluorometry) for next-day delivery to the SeaWIFS data base	BATS 61 -72 inclusive
Buesseler, K.	Slurper (Integrated water sampler)	Estimates of particle flux by ^{234}Th scavenging in the upper 150m.	BATS 61, 62,
Buesseler, K.	Total Thorium Particulate Thorium	Estimates of particle flux by ^{234}Th scavenging in the upper 150m.	BATS 62, 64, 65, 66, 66a, 67, 68, 69, 70, 71, 72
Jickells, T.	Dissolved I	Seasonal cycle of dissolved Iodine.	BATS 61, 62, 63, 64, 65, 66, 66a, 67, 67a, 68, 69, 70, 71, 72
Jickells, T.	Particulate I	Seasonal cycle of particulate Iodine.	BATS 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72.
Michaels, A.	Acantharia	Seasonal patterns in distribution and abundance of Acantharia (planktonic Sarcodines	BATS 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72
Ammerman, J.	DOP/POP	Phosphorus at BATS: Microbial Cycling of a Potentially Limiting Nutrient	BATS 61, 62, 63, 64, 65
Ammerman, J.	RNA/DNA	Quantification of contribution of nucleic acids to DOP pool	BATS 61
Olson, R.	Picoplankton	Picoplankton dynamics as measured by flow cytometry	BATS 62, 63, 64, 65, 65a, 66, 67, 68, 69, 70, 71, 72

PI	Acronym Descriptor	Description of Project	Cruises Sampled
Keeling, C.	DIC	Surface Time-series of DIC at BATS	BATS 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72
Lipshultz, F.	Go-Flo Cast	Seasonal Study of Nitrogen Cycling at BATS	BATS 61, 62, 63, 64, 65, 65a, 66, 67
Giovannoni, S.	RNA/DNA Bacteria	Investigation of Seasonal and Vertical Patterns in Bacterioplankton Communities at BATS by the hybridization of ribosomal RNA gene probes to nucleic acids extracted from filtered particulates.	BATS 61, 62, 63, 64, 65, 65a
Elardo, K.	Plankton Tow	Seasonal measurements of Nitrogen Fixation	BATS 62, 63, 64, 65, 65a, 66, 67, 68, 69, 70, 71, 72
Dacey, J.	DMS dissolved DMSP particulate DMSP	Seasonal Dynamics of DMS, dissolved DMSP and particulate DMSP in the Sargasso Sea	BATS 62, 63, 64, 65, 65a, 66, 66a (pDMSP only), 67, 68, 69, 70, 71, 72
Nelson, D./ Brzezinski, M.	Si Production	The annual silica cycle in the Sargasso Sea near Bermuda	BATS 62, 68
Wakeham, S.	Wakeham pumping	A study of the seasonal variation in lipid biomarker composition and stable carbon isotope signal. The aim was to link seasonal changes in dissolved CO2 to the photosynthetic isotope fractionation by phytoplankton. Deriving a relationship will help evaluate if stable carbon isotopic measurements are useful for indirectly determining seawater CO2 in the past	BATS 62, 63, 64, 65, 65a, 66, 67, 68, 69, 70, 71, 72
Carlson, C.	DOC, AODC, TDR (^{3}H-Thymidine), ^{3}H-leucine	Stocks and Dynamics of Bacterioplankton and DOC in the Sargasso Sea	BATS 64
Madin, L.	Zooplankton tows	Seasonal Variation in Zooplankton Biomass and Diversity at the Bermuda at Atlantic Time-Series (BATS) Station	BATS 66, 66A, 67, 68, 69, 70, 71, 72
Siegel, D../ Michaels, A./ Nelson, N.	DOM ACDOM AP	NASA Inherent Optical Properties. The BBOP data set has been adapted to address biogoechemical questions - in particular, the role of colored dissolved and detrital materials.	BATS 67, 67a, 68, 69, 70, 71, 72
DiTullio, J.	Go-Flo	Dust Enrichment Experiment	BATS 67
Gundersen, K.	^{3}H-leucine, EPA	Bacterial growth and nutrient dynamics	BATS 67, 67a, 69, 71
Siegal, D./ Michaels, A	Elzone	Samples for particle size and abundance were collected.	BATS 69, 70, 71, 72
Bishop, R	Zooplankton tow	Collection of Leptocephali	BATS 71
Taylor, M.	Phytoplankton tow	Phytoplankton speciation at BATS	BATS 71, 72
Francois, R.	seawater and particle samples for Ba, Sr, and S analysis	The goal was to obtain preliminary data for a full-blown study of the mechanism of barite formation in the water column.	BATS 72

References

Bishop, J.K.B. (1986). The correction and suspended particulate matter calibration of Sea Tech transmissometer. *Deep-Sea Research* **33**:121-134.

Carpenter, J.H. (1965). The Chesapeake Bay Institute. Technique for the Winkler oxygen method. *Limnology & Oceanography* **10**:141-143.

Coveney, M.F. and R.G. Wetzel. (1988). Experimental evaluation of conversion factors for the tritiated thymidine incorporation assay of bacterial secondary productivity. *Applied and Environmental Microbiology* **54**:2018-2026.

D.O.E., (1991). Handbook of methods for the analysis of the various parameters of the carbon dioxide system in seawater; version 1.0, (edited by A.G. Dickson and C. Goyet.)

Ducklow, H. and S.M. Hill. (1985). Tritiated thymidine incorporation and the growth of heterotrophic bacteria in warm core rings. *Limnology & Oceanography* **30**:260-272.

Fitzwater, S.E., Knauer, G.A., and Martin, J.H.(1982). Metal contamination and its effects on primary production measurement. *Limnology and Oceanography* **27**:544-551.

Gust G., A.F. Michaels, R. Johnson, W.G. Deuser and W. Bowles (1994). Mooring line motions and sediment trap hydrodynamics: in situ intercomparison of three common deployment designs. *Deep-Sea Research.* **I, 41**: 831-857.

Hobbie, J.E., Daley, R.J. and Jasper, S. (1977). Use of Nuclepore for counting bacteria by fluorescence microscopy. *Applied and Environmental Microbiology* **33**:1225-1228.

Johnson, K.M., Sieburth, J.M., Williams, P.J. leB., and Brandstrom, L. (1987). Coulometric total carbon dioxide analysis for marine studies: automation and calibration. *Marine Chemistry* **21**: 117-133.

Kirchman, D., H. Ducklow and R. Mitchell. (1982). Estimates of bacterial growth from changes in uptake rates and biomass. *Applied and Environmental Microbiology* **44**:1296-1307.

Newell, S.Y. and R.D. Fallon. (1982). Bacterial productivity in water column and sediments from Georgia coastal zone: estimates via direct counting and parallel measurements of thymidine incorporation. *Microbial Ecology* **8**:33-46.

Oudot, C. and Y. Montel. (1988). A high sensitivity method for the determination of nanomolar concentrations of nitrate and nitrite in seawater with a Technicon Autoanalyzer II. *Marine Chemistry* **24**:239-252.

Raimbault, P., Slawyk, G., Coste, B. and J. Fry. (1990). Feasibility of using automated colorimetric procedure for the determination of seawater nitrate in the 0 to 100 nM range: examples from field and culture. *Marine Biology* **104**:347-351

UNESCO (1991). Reference materials for oceanic carbon dioxide measurements. *In*: Report of the Sub-panel on Standards for CO2 Measurements of the Joint Panel on Oceanographic Tables and Standards. Report of meeting in Acapulco, Mexico, 29-31 August 1988. UNESCO Technical Papers in Marine Science.

Acknowledgments

The cover page lists the people directly responsible for data collection, analysis and quality control. The participants on each cruise are listed in the appropriate cruise report. In addition, there are a number of people who either helped make the data collection possible, or were involved with the production of this report. We extend many thanks to the crew of the R/V *Weatherbird II*: Captains Lee Black and Scott King; Chief engineers Tony Sherriff and Mark Laskowski; Mates Peter Hall and Jeff MacDonald; 2nd engineer Paul Bingel; deckhands George Pitcher; Stewards Bruce Paynter and Maggie Benn; and Marine Technicians Barry Bjork and Jeff Benson.

BATS 61

Cruise Report
Cruise dates: October 11-14, 1993
Personnel: R. Sheriff-Dow, F. Howse, T. Waterhouse, F. Bahr, L. Caporelli.
R/V *Weatherbird II*

11 October 1993

0715- Depart BBSR.

1350- Deploy PITs. Lat: 31.738 N; Long: 64.169 W
Slurper cast #1 (Buesseler)

1445- BBOP cast. Lat: 31.726 N; Long: 64.178 W

1525- **CTD cast 1**, 4200 m cast.
Lat: 31.720 N; Long: 64.178 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m

1909- CTD cast 1 on deck. Lat: 31.703 N; Long: 64.170 W

12 October1993

0430 - **GoFlo cast #1**, 140 m.
Lat: 31.676 N; Long: 64.179 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0610 - Deploy Primary Production array.
Lat: 31.678 N; Long: 64.169 W

0720 - BBOP cast. Lat: 31.672 N; Long: 64.177 W

0800 - BBOP failed.

0903 - **CTD cast 2**, 500 m cast.
Lat: 31.677 N; Long: 64.180 W
Nominal depths: replicates at 1, 10, 20, 20, 40, replicates at 60, 80, replicates at 100, 120, 140, 140, 140, 160, replicates at 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
DOP/POP (Ammerman)	1, 20, 60, 100, 140 and 250 m

RNA/DNA (Ammerman) 1, 20, 60, 100, 140 and 250 m

0950 - CTD cast 2 on deck. Lat: 31.684 N; Long: 64.173 W

1133- **CTD cast 3**, 500 m cast.
Lat: 31.671 N; Long: 64.168 W
Nominal depths: replicates at 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC	12 depths
DIC	12 depths
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	top 11 depths
picoplankton (Olson)	12 depths

1228 - CTD cast 3 on deck. Lat: 31.662 N; Long: 64.161 W

1701 - **CTD cast 4**, 500 m cast.
Lat: 31.636 N; Long: 64.188 W
Nominal depths: replicates at 1, 10, 25, 50, 60, 75, 100, 150, replicates at 200, 250, 300 m.

Samples:

RNA/DNA (Giovannoni)	1 and 200 m
bacteria-fixed (Giovannoni)	60, 100, 200 and 300 m

1757 - CTD cast 4 on deck. Lat: 31.628 N; Long: 64.186 W

1920 - Recover primary production array.
Lat: 31.626 N; Long: 64.178 W

2205 - Zooplankton tow 1 (BATS), 0-100 m (335 µm net). Lat: 31.625 N; Long: 64.173 W

2220 - Zooplankton tow 2 (BATS), 0-100 m (335 µm net). Lat: 31.624 N; Long:64.170 W

13 October 1993

0328 - Depart for Hydrostation S.

0725 - Arrive Hydrostation S.

0813 - BBOP cast. Lat: 32.171 N; Long: 64.499 W
failed on upcast.

0842 - **HS 753 CTD cast 1,** 2600 m cast.
Lat: 32.175 N; Long: 64.497 W

1125 - CTD cast on deck. Lat: 32.186 N; Long: 64.483 W

1240 - Depart for BATS.

1833 - Arrive BATS.

1842 - Plankton tow (Elardo), surface (330 µm net). Lat: 31.503 N; Long: 64.227W

1910 - **GoFlo cast #2** (Lipschultz). Lat: 31.495 N; Long: 64.232 W

14 October 1993

1410 - **Slurper cast #2** (Buesseler), 0-150 m. Lat: 31.411 N; Long: 64.304 W
Not completed, instrument malfunction.

1635 - Recover PITs. Lat: 31.392 N; Long: 64.317 W
300m cross hit stern and broke. 2 samples lost.

2232 - **CTD cast 5**, 250 m cast.
Lat: 32.166 N; Long: 64.500 W
Nominal depths: 1, 5, replicates at 10, 15, 20, 30, 40, 60, 80, 100, 120, replicates at 140 m.

Samples:

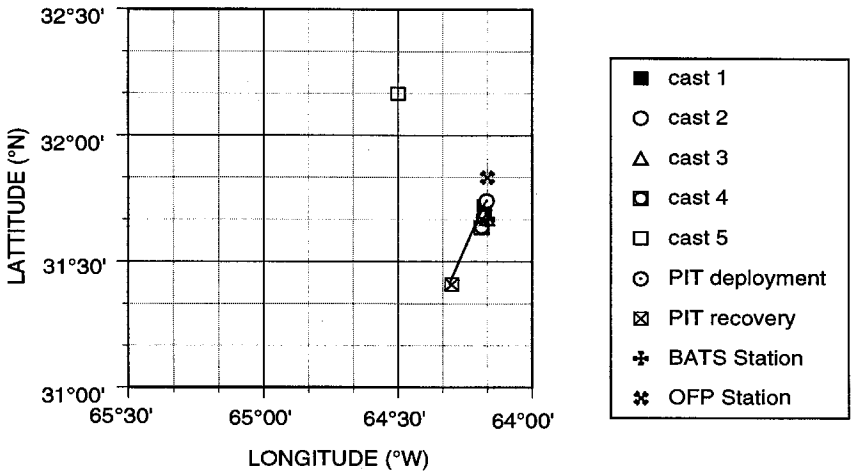
DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

2320 - CTD cast 5 on deck. Lat: 32.163 N; Long: 64.498 W
Depart for BBSR.

15 October 1993

0155 - Arrive BBSR.

Cast positions: BATS 61

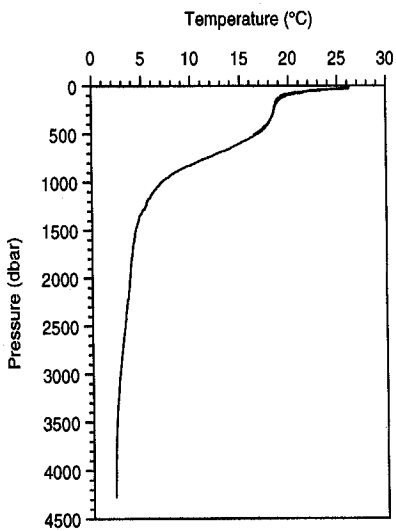


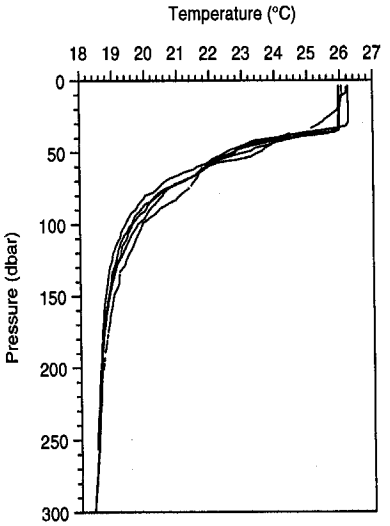
BATS 61, CTD Cast 1
October 11, 1993
Start cast: time: 1525 lat: 31.720 N long: 64.178 W
End cast: time: 1909 lat: 31.730 N long: 64.170 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
4.0	4.0	26.243	26.242	36.395	24.012	205.74	10.13	0.445	
10.0	10.1	26.246	26.244	36.398	24.014	205.60	10.01	0.441	
20.0	20.1	26.256	26.252	36.409	24.020	205.47	9.92	0.440	
30.0	30.2	26.232	26.225	36.415	24.032	205.91	10.29	0.440	
40.0	40.3	23.901	23.893	36.575	24.868	215.66	12.65	0.442	
50.0	50.4	22.481	22.471	36.605	25.306	219.34	11.44	0.439	
60.0	60.4	21.856	21.844	36.635	25.506	219.75	9.64	0.437	
70.0	70.5	21.102	21.088	36.620	25.705	222.80	9.89	0.437	
80.0	80.6	20.538	20.523	36.633	25.869	221.29	6.28	0.434	
90.0	90.6	20.132	20.115	36.654	25.995	217.34	0.81	0.437	
100.0	100.7	19.775	19.756	36.641	26.080	213.99	-3.96	0.430	
110.0	110.8	19.522	19.502	36.635	26.142	212.60	-6.35	0.427	
120.0	120.9	19.317	19.295	36.631	26.193	208.44	-11.33	0.420	
130.0	131.0	19.099	19.076	36.621	26.243	208.01	-12.64	0.415	
140.0	141.0	18.956	18.931	36.618	26.277	207.64	-13.60	0.408	
150.0	151.1	18.860	18.833	36.614	26.300	207.65	-13.98	0.404	
160.0	161.2	18.786	18.757	36.608	26.314	208.12	-13.82	0.402	
170.0	171.3	18.723	18.693	36.604	26.327	209.05	-13.15	0.401	
180.0	181.3	18.683	18.651	36.601	26.336	209.97	-12.40	0.399	
190.0	191.4	18.657	18.623	36.604	26.345	209.89	-12.58	0.398	
200.0	201.5	18.637	18.601	36.602	26.350	210.39	-12.17	0.398	
210.0	211.6	18.622	18.584	36.602	26.354	210.38	-12.24	0.399	
220.0	221.7	18.595	18.556	36.601	26.360	210.09	-12.64	0.398	
230.0	231.7	18.582	18.541	36.601	26.364	210.18	-12.60	0.398	
240.0	241.8	18.570	18.527	36.600	26.367	209.99	-12.85	0.399	
250.0	251.9	18.549	18.504	36.600	26.372	209.76	-13.16	0.399	
275.0	277.1	18.464	18.415	36.593	26.390	208.56	-14.72	0.400	
300.0	302.3	18.383	18.329	36.585	26.405	208.19	-15.43	0.400	
325.0	327.5	18.290	18.232	36.570	26.418	206.08	-17.96	0.402	
350.0	352.7	18.158	18.097	36.545	26.433	204.20	-20.42	0.402	
375.0	378.0	18.036	17.970	36.524	26.449	204.33	-20.84	0.402	
400.0	403.2	17.880	17.810	36.499	26.469	201.27	-24.59	0.403	
425.0	428.4	17.691	17.617	36.465	26.490	198.68	-28.04	0.403	
450.0	453.6	17.486	17.409	36.427	26.512	193.33	-34.32	0.404	
475.0	478.9	17.160	17.079	36.368	26.547	185.79	-43.36	0.404	
500.0	504.1	16.755	16.672	36.296	26.589	180.45	-50.59	0.403	
550.0	554.6	15.909	15.820	36.154	26.678	174.70	-60.36	0.401	
600.0	605.1	14.897	14.804	35.987	26.777	165.21	-74.83	0.398	
650.0	655.6	13.954	13.857	35.834	26.863	160.17	-84.70	0.395	
700.0	706.1	12.639	12.541	35.640	26.981	155.95	-95.91	0.392	
750.0	756.6	11.477	11.378	35.494	27.091	157.73	-100.57	0.389	
800.0	807.2	10.328	10.229	35.354	27.189	151.70	-113.28	0.387	
850.0	857.7	9.199	9.100	35.234	27.286	150.36	-121.46	0.385	
900.0	908.3	8.279	8.181	35.166	27.377	158.89	-118.67	0.384	
950.0	958.9	7.569	7.470	35.129	27.454	168.11	-114.01	0.382	
1000.0	1009.4	6.990	6.889	35.118	27.527	182.26	-103.65	0.381	
1050.0	1060.0	6.538	6.436	35.115	27.587	193.69	-95.22	0.379	
1100.0	1110.7	6.144	6.040	35.110	27.635	204.29	-87.28	0.379	
1150.0	1161.3	5.874	5.768	35.114	27.673	212.98	-80.43	0.377	
1200.0	1211.9	5.539	5.430	35.092	27.697	223.03	-72.76	0.376	
1300.0	1313.2	5.041	4.927	35.052	27.725	236.70	-62.71	0.376	

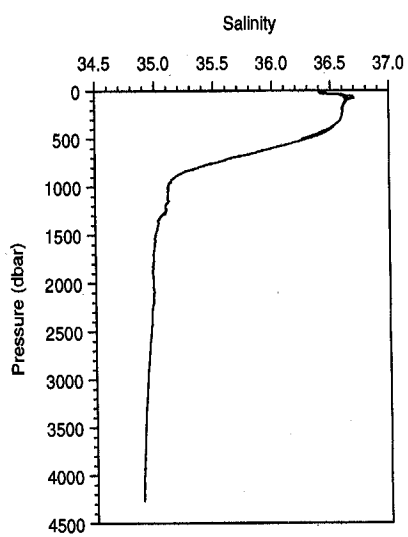
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.643	4.524	35.024	27.749	246.50	-55.85	0.373	
1500.0	1516.0	4.372	4.246	35.004	27.763	252.81	-51.57	0.372	
1600.0	1617.4	4.225	4.092	34.999	27.776	256.04	-49.43	0.370	
1700.0	1718.9	4.057	3.916	34.986	27.784	259.27	-47.48	0.370	
1800.0	1820.5	3.953	3.804	34.983	27.793	260.74	-46.80	0.369	
1900.0	1922.1	3.854	3.696	34.982	27.803	261.91	-46.38	0.370	
2000.0	2023.7	3.773	3.607	34.984	27.814	261.87	-47.03	0.369	
2100.0	2125.4	3.690	3.515	34.986	27.825	261.51	-48.00	0.369	
2200.0	2227.2	3.562	3.379	34.981	27.834	262.08	-48.43	0.369	
2300.0	2328.9	3.438	3.247	34.973	27.841	263.07	-48.41	0.369	
2400.0	2430.8	3.363	3.163	34.973	27.849	262.77	-49.29	0.367	
2500.0	2532.7	3.235	3.028	34.962	27.852	264.32	-48.75	0.367	
2600.0	2634.6	3.112	2.897	34.955	27.859	264.94	-49.10	0.367	
2700.0	2736.6	2.999	2.775	34.948	27.864	265.87	-49.08	0.368	
2800.0	2838.6	2.890	2.658	34.942	27.869	266.76	-49.06	0.367	
2900.0	2940.7	2.782	2.542	34.935	27.875	267.79	-48.90	0.366	
3000.0	3042.8	2.692	2.444	34.930	27.879	268.23	-49.19	0.365	
3100.0	3144.9	2.602	2.344	34.925	27.883	268.81	-49.33	0.365	
3200.0	3247.2	2.518	2.252	34.920	27.887	268.99	-49.84	0.365	
3300.0	3349.4	2.448	2.173	34.915	27.890	268.90	-50.51	0.365	
3400.0	3451.7	2.385	2.100	34.911	27.892	268.93	-51.00	0.365	
3500.0	3554.1	2.330	2.036	34.906	27.894	268.59	-51.78	0.364	
3600.0	3656.5	2.290	1.986	34.903	27.895	268.00	-52.71	0.365	
3700.0	3758.9	2.263	1.949	34.900	27.896	267.28	-53.65	0.365	
3800.0	3861.4	2.241	1.915	34.897	27.896	266.50	-54.62	0.365	
3900.0	3964.0	2.226	1.889	34.895	27.896	265.70	-55.55	0.367	
4000.0	4066.5	2.215	1.867	34.893	27.896	264.81	-56.53	0.368	
4100.0	4169.2	2.214	1.854	34.891	27.896	263.63	-57.73	0.369	
4200.0	4271.8	2.210	1.839	34.889	27.896	262.59	-58.80	0.372	

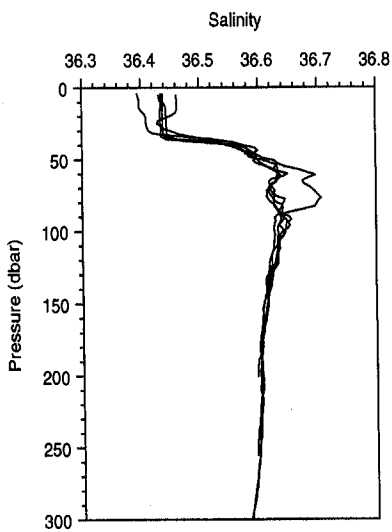
BATS 61—CTD Temperature Profiles



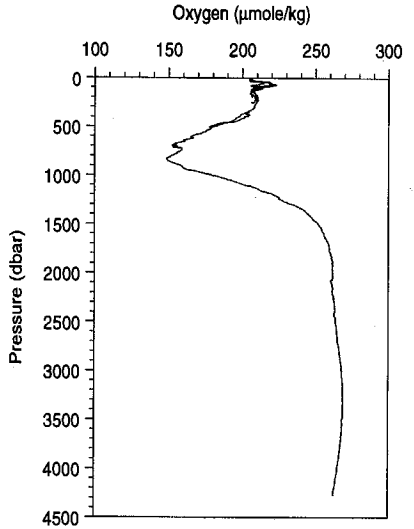


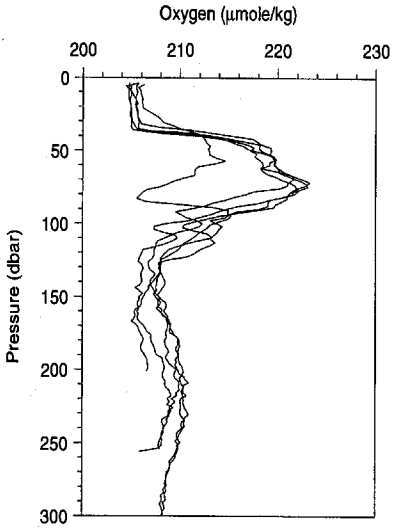
BATS 61—CTD Salinity Profiles



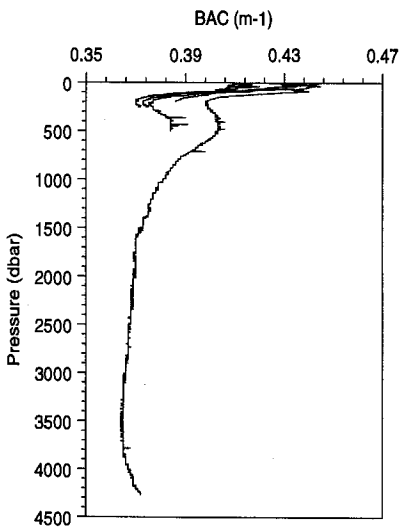


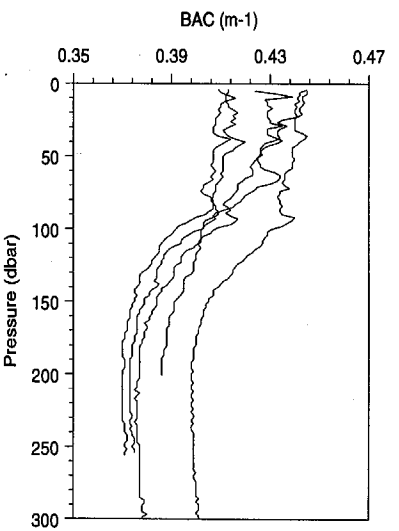
BATS 61—CTD Oxygen Profiles



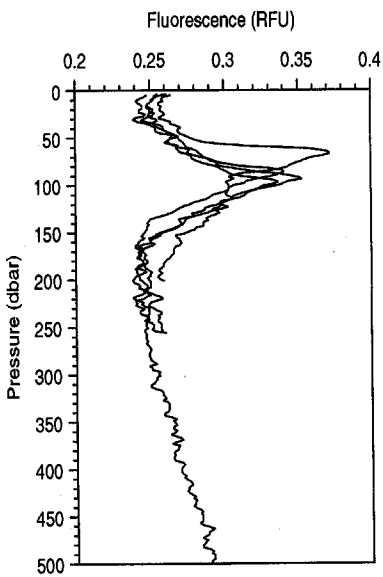


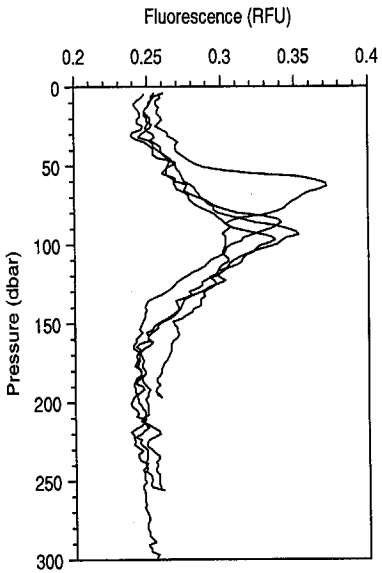
BATS 61—CTD BAC Profiles



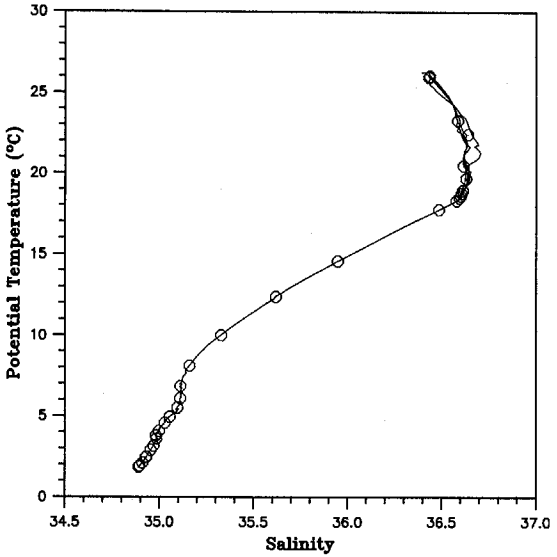


BATS 61- CTD Fluorescence Profiles

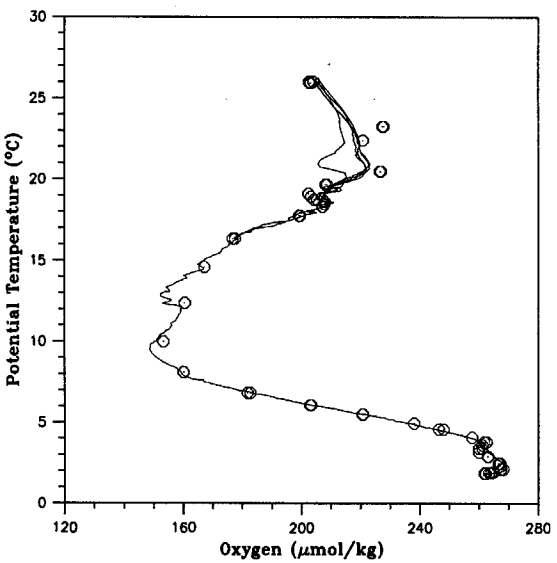




BATS 61- T-S Diagram



BATS 61- T-O Diagram



BATS 61—Bottle Data
October 11-14, 1993
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10610302	1.9	1.9	26.021	36.435	26.020		24.112
10610301	2.0	2.1	26.021	36.435	26.021	36.437	24.114
10610303	10.8	10.9	25.959	36.433	25.957	36.434	24.131
10610304	11.1	11.2	25.958	36.433	25.955		24.131
10610306	20.2	20.3	25.944	36.433	25.939		24.136
10610305	20.6	20.7	25.945	36.433	25.940	36.434	24.136
10610307	41.2	41.5	23.267	36.586	23.258	36.586	25.064
10610308	41.3	41.6	23.370	36.585	23.361		25.032
10610310	51.4	51.8	22.420	36.638	22.409		25.348
10610309	51.8	52.1	22.405	36.639	22.395	36.641	25.355
10610312	75.9	76.4	20.469	36.619	20.454		25.877
10610311	76.2	76.8	20.474	36.618	20.460	36.617	25.874
10610314	90.9	91.5	19.683	36.634	19.666		26.099
10610313	91.1	91.7	19.680	36.638	19.663	36.631	26.097
10610316	120.2	121.1	19.139	36.624	19.117		26.234
10610315	120.3	121.2	19.136	36.624	19.114		26.235
10610317	138.7	139.7	18.960	36.614	18.934	36.613	26.273
10610318	139.5	140.5	18.958	36.614	18.932		26.274
10610320	159.9	161.1	18.786	36.608	18.757		26.314
10610319	160.2	161.3	18.781	36.608	18.752	36.606	26.314
10610321	202.3	203.9	18.634	36.604	18.597	36.602	26.351
10610322	202.8	204.3	18.632	36.604	18.596		26.352
10610324	250.7	252.6	18.533	36.598	18.488		26.375
10610323	250.7	252.6	18.531	36.597	18.487	36.595	26.373
10610101	302.0	304.4	18.366	36.580	18.312	36.579	26.405
10610102	399.9	403.0	17.820	36.486	17.750	36.486	26.474
10610103	501.5	505.6	16.418	36.237	16.335		26.623
10610104	600.5	605.6	14.674	35.949	14.582	35.949	26.796
10610105	700.4	706.5	12.469	35.620	12.372	35.619	26.998
10610106	799.5	806.6	10.082	35.328	9.985	35.329	27.212
10610107	900.0	908.3	8.192	35.162	8.094	35.161	27.386
10610108	1000.9	1010.3	6.929	35.113	6.829	35.113	27.532
10610109	1101.4	1112.1	6.179	35.110	6.074	35.111	27.631
10610110	1199.3	1211.2	5.598	35.094	5.489	35.096	27.693
10610111	1298.8	1312.0	5.042	35.054	4.928	35.055	27.728
10610112	1400.3	1414.9	4.674	35.029	4.554	35.029	27.749
10610113	1601.8	1619.2	4.183	34.996	4.050	34.998	27.779
10610114	1801.8	1822.3	3.925	34.981	3.776	34.981	27.795
10610115	1999.1	2022.8	3.752	34.984	3.586	34.984	27.816
10610116	2200.6	2227.7	3.551	34.980	3.368		27.834
10610117	2399.3	2430.0	3.342	34.971	3.142	34.970	27.848
10610118	2603.4	2638.1	3.093	34.954	2.878	34.954	27.860
10610119	2998.6	3041.3	2.700	34.931	2.452	34.932	27.880
10610120	3000.0	3042.8	2.700	34.931	2.451	34.929	27.878
10610121	3401.9	3453.7	2.386	34.911	2.102	34.911	27.892
10610122	3801.8	3863.3	2.242	34.897	1.916	34.896	27.895
10610123	4002.6	4069.2	2.217	34.892	1.869	34.891	27.895
10610124	4200.3	4272.2	2.211	34.889	1.839	34.890	27.897

BATS 61—Bottle Data
October 11-14, 1993
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10610301	2.0	204.13	202.60	7.88	6.35	2017
10610303	10.8	203.12	203.29	6.66	6.83	2017
10610305	20.6	202.98	202.81	6.48	6.31	2017
10610307	41.2	227.44	227.97	22.28	22.80	2036
10610309	51.8	220.93	220.80	12.82	12.69	2047
10610311	76.2	226.62	226.97	11.34	11.69	2055
10610313	91.1	208.70	208.18	-9.62	-10.14	2074
10610315	120.3	202.33	202.50	-18.17	-18.00	2080
10610317	138.7	203.20	203.25	-18.03	-17.98	2082
10610319	160.2	205.32	204.32	-16.64	-17.64	2080
10610321	202.3		208.02		-14.55	2080
10610323	250.7	207.70	207.84	-15.29	-15.16	2080
10610101	302.0	207.30	207.08	-16.40	-16.62	
10610102	399.9	199.19	199.63	-26.94	-26.51	
10610103	501.5	176.73	177.51	-55.90	-55.12	
10610104	600.5		167.15		-74.02	
10610105	700.4	160.65	160.39	-92.13	-92.39	
10610106	799.5	153.20	153.37	-113.24	-113.07	
10610107	900.0	159.96	160.22	-118.16	-117.90	
10610108	1000.9	182.65	181.74	-103.66	-104.58	
10610109	1101.4	202.87	203.35	-88.47	-88.00	
10610110	1199.3	220.56	220.87	-74.81	-74.51	
10610111	1298.8	238.09	238.14	-61.30	-61.26	
10610112	1400.3	246.43	248.04	-55.68	-54.07	
10610113	1601.8		257.67		-48.13	
10610114	1801.8	262.58	261.80	-45.18	-45.96	
10610115	1999.1	261.13	261.09	-47.92	-47.97	
10610116	2200.6	259.98	261.11	-50.61	-49.48	
10610117	2399.3	260.02	259.98	-52.20	-52.25	
10610118	2603.4	263.17	262.95	-51.03	-51.24	
10610119	2998.6	267.19	266.89	-50.16	-50.46	
10610120	3000.0	266.57		-50.78		
10610121	3401.9	268.21	267.47	-51.70	-52.44	
10610122	3801.8	264.94	264.90	-56.17	-56.22	
10610123	4002.6	264.11	263.42	-57.21	-57.91	
10610124	4200.3	262.27	261.83	-59.12	-59.55	

BATS 61—Bottle Data
October 11-14, 1993
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10610301	2.0	0.00	0.00	0.00	0.8
10610303	10.8	0.00	0.00	0.00	0.8
10610305	20.6	0.00	0.00	0.00	0.8
10610307	41.2	0.00	0.00	0.00	0.7
10610309	51.8	0.00	0.00	0.00	0.6
10610311	76.2	0.00	0.00	0.00	0.7
10610313	91.1	0.28	0.09	0.00	0.6
10610315	120.3	1.63	0.03	0.05	0.6
10610317	138.7	2.16	0.00	0.08	0.5
10610319	160.2	2.48	0.00	0.10	0.6
10610321	202.3	2.51	0.00	0.11	0.8
10610323	250.7	2.54	0.00	0.12	0.6
10610101	302.0	2.92	0.00	0.13	0.8
10610102	399.9	4.48	0.00	0.21	1.3
10610103	501.5	8.97	0.00	0.50	2.7
10610104	600.5		0.00		4.9
10610105	700.4	16.14	0.00	1.04	7.9
10610106	799.5	21.00	0.00	1.38	12.1
10610107	900.0	23.29	0.00	1.56	15.0
10610108	1000.9	21.42	0.00	1.48	15.4
10610109	1101.4	21.01	0.00	1.43	14.7
10610110	1199.3	19.85	0.00	1.36	14.1
10610111	1298.8	18.81	0.00	1.28	13.0
10610112	1400.3	17.80	0.00	1.23	13.1
10610113	1601.8	17.91	0.00	1.23	13.3
10610114	1801.8	17.99	0.00	1.25	14.3
10610115	1999.1	17.85	0.00	1.23	15.8
10610116	2200.6		0.00		17.8
10610117	2399.3	18.00	0.00	1.27	19.9
10610118	2603.4		0.00		21.5
10610119	2998.6	18.04	0.00	1.28	23.6
10610120	3000.0		0.00		23.8
10610121	3401.9	18.04	0.00	1.30	27.8
10610122	3801.8	18.83	0.00	1.36	33.0
10610123	4002.6	19.12	0.00	1.39	35.5
10610124	4200.3	19.47	0.00	1.42	37.3

BATS 61—Bottle Data
October 11-14, 1993
Particulates, Bacterial Abundance and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10610302	1.9	21.54	3.86	4.82	0.078	0.020
10610304	11.1	30.63	4.64	5.98	0.098	0.010
10610306	20.2	22.77	4.58	6.41	0.098	0.010
10610308	41.3	31.25	5.55	5.94	0.137	0.020
10610310	51.4	28.14	5.48	7.62	0.185	0.000
10610312	75.9	15.04	3.00	7.03	0.214	0.107
10610314	90.9	22.74	4.57	4.07	0.175	0.234
10610316	120.2	14.43	3.00	2.94	0.049	0.127
10610318	139.5	14.18	2.03	2.43	0.049	0.049
10610320	159.9	9.55	1.18	1.77	0.019	0.000
10610322	202.8	8.02	0.85	1.86	0.000	0.010
10610324	250.7	19.43	1.89			
10610101	302.0	9.01	1.64	1.35		
10610102	399.9	7.21	1.11	1.41		
10610103	501.5	7.70	0.92			
10610104	600.5	4.43	1.18			
10610105	700.4	12.22	1.96			
10610106	799.5	8.04	1.11			
10610107	900.0	10.67	0.98			
10610108	1000.9	13.13	1.50			
10610109	1101.4			0.46		
10610112	1400.3			0.55		
10610120	3000.0			0.38		
10610123	4002.6			0.34		

BATS 61—Bottle Data
October 11-14, 1993
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin+Lutein
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10610302	1.9	3	6	5	17	24	0	78	0
10610304	11.1	6	9	5	19	24	0	70	0
10610306	20.2	8	6	5	19	26	0	71	6
10610308	41.3	6	10	5	27	44	14	125	6
10610310	51.4	8	11	5	30	42	17	154	9
10610312	75.9	15	23	5	60	44	47	251	18
10610314	90.9	20	47	5	65	27	130	286	23
10610316	120.2	10	20	5	37	8	73	112	16
10610318	139.5	3	12	5	26	2	27	57	0
10610320	159.9	0	3	5	7	0	0	8	0
10610322	202.8	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10610302	1.9	3	0	0	0	11	0	1
10610304	11.1	2	0	0	0	10	0	0
10610306	20.2	5	0	0	0	8	0	1
10610308	41.3	5	0	0	0	6	0	0
10610310	51.4	4	0	4	0	4	0	0
10610312	75.9	10	0	3	0	4	1	3
10610314	90.9	12	0	0	0	2	1	2
10610316	120.2	7	0	0	0	3	0	1
10610318	139.5	5	0	0	0	0	0	0
10610320	159.9	0	0	0	0	0	0	0
10610322	202.8	0	0	0	0	0	0	0

BATS 61: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	4.80	5.23	3.95	0.37	0.21	1.01	0.58	0.52
20	3.49	4.86	5.05	0.26	0.19	1.90	1.98	2.86
40	5.51	5.34	5.87	0.41	0.20	3.38	2.36	2.39
60	2.67	2.98	2.72	0.42	0.50	1.19	1.49	1.32
80	1.93	1.53	1.70	0.40	0.33	1.89	1.79	1.59
100	0.92	1.26	1.33	0.36	0.33	2.06	2.32	2.01
120	0.57	0.66	0.65	0.44	0.22	0.59	0.64	0.50
140	0.27	0.30	0.25	0.23	0.48	0.16	0.16	0.34

BATS 61: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg/m^2/d)	Nitrogen (mg/m^2/d)
150	289	74.42	21.60	4.20
150	290	67.94	19.78	3.88
150	291	72.80	17.73	2.62
200	292	61.47		
200	293	60.66		
200	294	62.28		
300	295	24.27	2.70	0.28
300	296	31.55	5.71	0.64
300	297	42.87	12.43	1.10

BATS 62

Cruise Report

Cruise dates: November 8-12, 1993

Personnel: F. Howse, A. Close, K. Gundersen, R. Kelly, L. Caporelli, K. Close (UCSB), J. Arrington, (OSU), C. De La Rocha (OSU).

R/V *Weatherbird II*

8 November 1993

0710 - Depart BBSR.

1227 - Arrive at BATS station.

1310 - Deploy PITs. Lat: 31.747 N; Long: 64.173 W

1353 - **Slurper cast #1** (Buesseler), 0-150 m. Lat: 31.736 N; Long: 64.171 W

1439 - BBOP cast. Lat: 31.735 N; Long: 64.171 W

1526 - **CTD cast 1**, 4200 m cast.
Lat: 31.731 N; Long: 64.167 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC	300, 400 and 700
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000 m

1925 - CTD cast 1 on deck. Lat: 31.721 N; Long: 64.193 W

1935 - BBOP cast. Lat: 31.722 N; Long: 64.195 W

2000 - **GoFlo cast #1** (Si Production). Lat: 31.723 N; Long: 64.202 W

2110 - Deploy Array "A"- 12 hour Si incubation. Lat: 31.733 N; Long: 64.224 W

2238 - Deploy Array "B" - 24 hour Si dissolution. Lat: 31.737 N; Long: 64.224 W

2245 - BBOP cast. Lat: 31.738 N; Long: 64.225 W

9 November 1993

0102 - BBOP cast. Lat: 31.740 N; Long: 64.236 W

0127 - BBOP cast. Lat: 31.742 N; Long: 64.238 W
High voltage at surface.Wire is broken

0245 - **GoFlo cast #2** (Si 12 hour Incubation), 160 m. Lat: 31.734 N; Long: 64.242 W

0346 - **GoFlo cast #3**, 140 m.
Lat: 31.734 N; Long: 64.240 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0500 - Retrieve Array "A" Lat: 31.724 N; Long: 64.256 W

0536 - Deploy primary production array.
Lat: 31.720 N; Long: 64.257 W

0900- **CTD cast 2**, 500 m cast.
Lat: 31.691 N; Long: 64.251 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 250, 250, 250, 250 m.

Samples:

acantharia (Michaels)	top 10 depths
DOP/POP (Ammerman)	1, 20, 60, 100, 140 and 250 m

0956 - CTD cast 2 on deck. Lat: 31.700 N; Long: 64.254 W

1025 - BBOP cast. Lat: 31.705 N; Long: 64.254 W
system crash on upcast

1117 - BBOP cast. Lat: 31.718 N; Long: 64.265 W

1138 - Begin Wakeham pumping. Lat: 31.722 N; Long: 64.515 W

1143 - **CTD cast 3**, 500 m cast.
Lat: 31.722 N; Long: 64.265 W
Nominal depths: replicates at 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	top 11 depths
picoplankton (Olson)	12 depths

1245 - CTD cast 3 on deck. Lat: 31.732 N; Long: 64.265 W

1253 - End Wakeham pumping. Pump failed

1602- **CTD cast 4**, 500 m cast.
Lat: 31.707 N; Long: 64.280 W
Nominal depths: replicates at 1, replicates at 10, 150, 200, 200, 200, 200, 300 m.

Samples:

RNA/DNA (Giovannoni)	1, and 200 m
bacteria, fixed (Giovannoni)	1, 60, and 200 m

1647 - CTD cast 4 on deck. Lat: 31.713 N; Long: 64.287 W

1836 - Recover primary production array.
Lat: 31.692 N; Long: 64.308 W

1936 - Retrieve Array "B".
Lat: 31.700 N; Long: 64.312 W

1995 - Depart for Hydrostation S.

2305 - Arrive at Hydrostation S.

2310 - **HS 755 CTD cast 1,** 2600 m cast.
Lat: 32.178 N; Long: 64.501 W

10 November 1993

0156 - HS 755 CTD cast on deck. Lat: 32.162 N; Long: 64.502 W

0205 - Depart for BBSR.

0430 - Arrive BBSR

1840 - Depart BBSR

11 November 1993

0107 - BBOP cast. Lat: 31.699 N; Long: 64.359 W

0154 - **GoFlo cast #4** (Lipschultz). Lat: 31.667 N; Long: 64.372 W

0258 - **GoFlo cast #5** (Si dissolution). Lat: 31.659 N; Long: 64.375 W

0414 - BBOP cast. Lat: 32.519 N; Long: 64.372 W

0525 - Array "B" deployed. Lat: 31.648 N; Long: 64.373 W

0619 - Array "A" deployed. Lat: 31.638 N; Long: 64.379 W

0632 - **GoFlo cast #6** (Si dissolution). Lat: 31.637 N; Long: 64.388 W

0815 - BBOP cast. Lat: 31.629 N; Long: 64.480 W

0910 - **CTD cast 5**, 1000 m cast.
Lat: 31.633 N; Long: 64.410 W
Nominal depths: 20, 20, 20, 20, 20, 20, 80, 80, 80, 80, 80, replicates at 200 m, replicates at 1000 m.
Samples:
DIC time-series 4 depths

1019 - CTD cast 5 on deck. Lat: 31.635 N; Long: 64.420 W

1118 - BBOP cast. Lat: 31.630 N; Long: 64.393 W

1406 - BBOP cast. Lat: 31.628 N; Long: 64.404 W

1504 - **CTD cast 6** and **CTD cast 7** (Calibration yo-yo), 400 m cast
Lat: 31.31.624 N; Long: 64.408 W

1552 - CTD casts 6 and 7 on deck. Lat: 31.625 N; Long: 64.416 W

1659 - BBOP cast. Lat: 31.625 N; Long: 64.416 W

1830 - **GoFlo cast #7** (Si dissolution). Lat: 31.626 N; Long: 64.424 W

1935 - Retrieve Array "B". Lat:31.366 N; Long: 64.419 W

1940 - Redeploy array (12 hour Si production). Lat: 31.610 N; Long: 64.421 W

2053 - **GoFlo cast #8** (Lipshultz). Lat: 31.612 N; Long: 64.433 W

2123 - BBOP cast. Lat: 31.613 N; Long: 64.445 W

2145 - Zooplankton tow (BATS), 0-100 m (335 µm net).

2156 - Zooplankton tow (BATS), 0-100 m (335 µm net).

12 November 1993

0010 - BBOP cast. Lat: 31.607 N; Long: 64.419 W

0528 - Retrieve Array "A" Lat: 31.574 N; Long: 64.448 W

0624 - Retrieve Array "B" Lat: 31.577 N; Long: 64.461 W

0642 - **Slurper casts #2-4.** Slurper malfunction - no samples.

0755 - **Slurper cast #5** (Buesseler), 0-150 m.
Lat: 32.596 N; Long: 64.473 W

0824 - **Slurper cast #6** (Buesseler), 0-50 m.
Lat: 32.604 N; Long: 64.476 W

0855 - **Slurper cast #7** (Buesseler), 50-100 m.
Lat: 32.611 N; Long: 64.481 W

0929 - **Slurper cast #8** (Buesseler), 100-150 m.
Lat: 32.624 N; Long: 64.489 W

1000 - **Slurper cast #9** (Buesseler), 0-150 m.
Lat: 32.617 N; Long: 64.486 W

1135 - Recover PITs. Lat: 31.575 N; Long: 64.489 W

1136 - Depart for Station S.

1529 - Arrive at Station S.

1532 - **CTD cast 8**, 500 m cast.
Lat: 32.168 N; Long: 64.500 W
Nominal depths: 1, 1, 5, 5,10, 10, 15, 15, 20, 20, 30, 30, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140 m.

Samples:

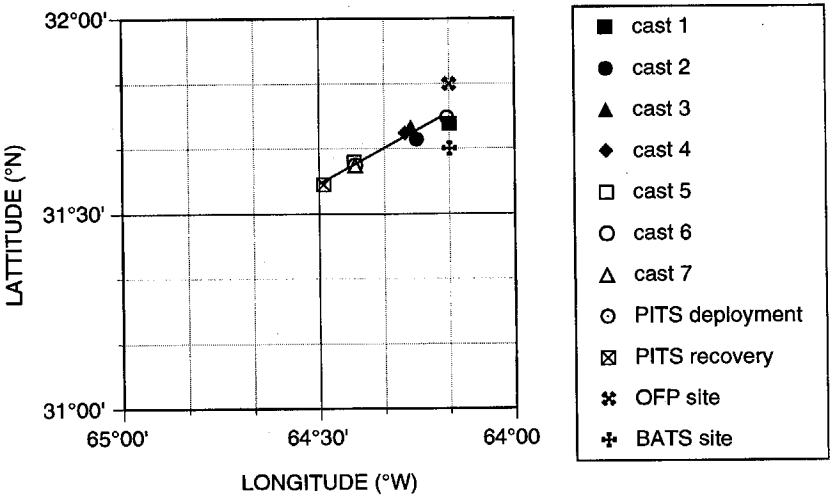
DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

1633 - CTD cast 8 on deck. Lat: 32.168 N; Long: 64.513 W

1637 - Depart for BBSR.

1900 - Arrive at BBSR.

Cast positions: BATS 62

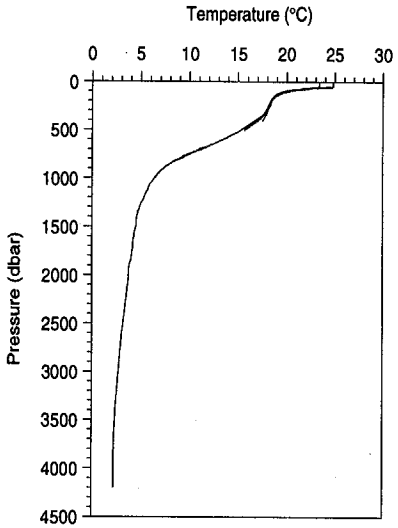


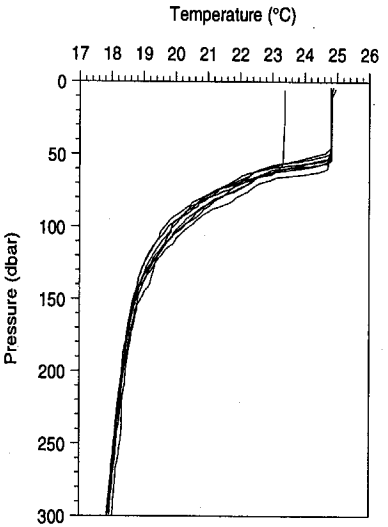
BATS 62, CTD Cast 1
November 8, 1993
Start cast: time: 1526 lat: 31.731 N long: 64.167 W
End cast: time: 1925 lat: 31.721 N long: 64.193 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	$Sigma_\theta$ (kg/m^3)	CTD θ_2 (µmole/kg)	θ_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
5.0	5.0	24.883	24.882	36.448	24.474	212.24	12.33	0.435	
10.0	10.1	24.820	24.817	36.476	24.514	212.25	12.17	0.435	
20.0	20.1	24.851	24.847	36.524	24.542	212.14	12.23	0.433	
30.0	30.2	24.835	24.829	36.529	24.552	212.33	12.38	0.432	
40.0	40.3	24.822	24.813	36.530	24.557	211.88	11.88	0.430	
50.0	50.4	24.808	24.797	36.528	24.561	212.29	12.25	0.428	
60.0	60.4	22.775	22.763	36.595	25.214	238.87	32.00	0.440	
70.0	70.5	21.661	21.647	36.628	25.556	245.07	34.25	0.434	
80.0	80.6	20.834	20.819	36.624	25.781	240.54	26.64	0.429	
90.0	90.6	20.290	20.273	36.618	25.925	234.60	18.62	0.426	
100.0	100.7	19.894	19.876	36.627	26.038	227.88	10.38	0.419	
110.0	110.8	19.548	19.527	36.618	26.123	220.59	1.71	0.417	
120.0	120.9	19.271	19.249	36.606	26.186	213.68	-6.31	0.416	
130.0	131.0	19.047	19.024	36.598	26.238	205.76	-15.14	0.413	
140.0	141.0	18.854	18.829	36.587	26.280	199.03	-22.67	0.409	
150.0	151.1	18.718	18.691	36.582	26.311	196.27	-25.99	0.405	
160.0	161.2	18.612	18.583	36.575	26.333	197.26	-25.44	0.403	
170.0	171.3	18.534	18.504	36.571	26.351	198.77	-24.25	0.401	
180.0	181.3	18.483	18.451	36.569	26.362	198.95	-24.29	0.401	
190.0	191.4	18.432	18.398	36.565	26.373	199.22	-24.24	0.400	
200.0	201.5	18.381	18.345	36.562	26.384	199.89	-23.79	0.399	
210.0	211.6	18.324	18.287	36.557	26.395	199.31	-24.61	0.399	
220.0	221.7	18.264	18.225	36.551	26.405	198.40	-25.77	0.400	
230.0	231.7	18.197	18.156	36.543	26.417	198.92	-25.55	0.399	
240.0	241.8	18.144	18.101	36.538	26.426	199.96	-24.74	0.400	
250.0	251.9	18.091	18.048	36.532	26.435	200.24	-24.68	0.400	
275.0	277.1	17.991	17.942	36.520	26.452	201.03	-24.34	0.401	
300.0	302.3	17.870	17.818	36.502	26.469	201.15	-24.75	0.402	
325.0	327.5	17.732	17.676	36.477	26.486	200.09	-26.43	0.402	
350.0	352.7	17.482	17.422	36.430	26.511	195.25	-32.42	0.403	
375.0	378.0	17.177	17.113	36.375	26.544	192.37	-36.69	0.404	
400.0	403.2	16.808	16.741	36.309	26.582	188.66	-42.13	0.404	
425.0	428.4	16.444	16.374	36.246	26.620	186.99	-45.51	0.404	
450.0	453.6	15.996	15.924	36.169	26.666	185.12	-49.52	0.404	
475.0	478.9	15.625	15.549	36.108	26.704	183.41	-53.03	0.405	
500.0	504.1	15.209	15.131	36.038	26.745	181.56	-56.92	0.404	
550.0	554.6	14.231	14.149	35.879	26.836	175.21	-68.22	0.402	
600.0	605.1	13.317	13.230	35.740	26.921	168.55	-79.66	0.400	
650.0	655.6	12.171	12.082	35.573	27.019	162.29	-92.15	0.396	
700.0	706.1	11.117	11.027	35.433	27.108	158.00	-102.40	0.393	
750.0	756.6	9.928	9.838	35.282	27.200	151.36	-116.07	0.391	
800.0	807.2	8.881	8.790	35.180	27.293	156.45	-117.40	0.390	
850.0	857.7	7.863	7.773	35.131	27.411	169.37	-110.89	0.386	
900.0	908.3	7.195	7.104	35.131	27.508	180.80	-103.74	0.383	
950.0	958.9	6.693	6.600	35.123	27.571	191.11	-96.75	0.382	
1000.0	1009.4	6.308	6.213	35.127	27.626	202.06	-88.36	0.381	
1050.0	1060.0	5.956	5.858	35.114	27.661	210.22	-82.64	0.380	
1100.0	1110.7	5.736	5.635	35.117	27.692	217.71	-76.65	0.377	
1150.0	1161.3	5.463	5.360	35.100	27.712	224.58	-71.72	0.376	
1200.0	1211.9	5.281	5.175	35.090	27.727	230.10	-67.50	0.376	
1300.0	1313.2	4.837	4.725	35.055	27.751	239.91	-60.96	0.374	

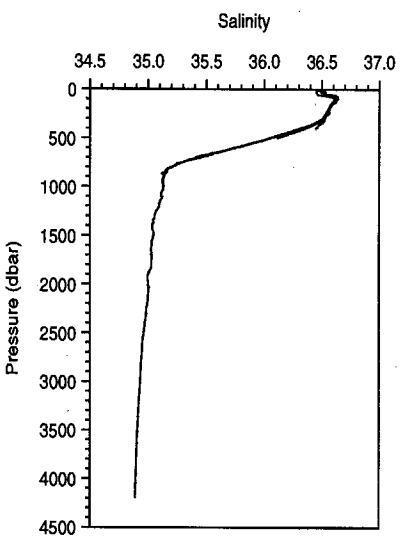
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.544	4.425	35.034	27.767	246.28	-56.77	0.372	
1500.0	1516.0	4.448	4.321	35.042	27.785	249.21	-54.51	0.369	
1600.0	1617.4	4.250	4.116	35.028	27.796	252.52	-52.69	0.369	
1700.0	1718.9	4.172	4.029	35.032	27.809	254.19	-51.60	0.368	
1800.0	1820.5	4.037	3.886	35.026	27.819	255.30	-51.51	0.368	
1900.0	1922.1	3.774	3.617	34.996	27.822	257.23	-51.64	0.369	
2000.0	2023.7	3.741	3.575	35.004	27.833	257.85	-51.24	0.367	
2100.0	2125.4	3.623	3.449	34.998	27.841	257.89	-52.11	0.366	
2200.0	2227.2	3.513	3.331	34.990	27.846	258.23	-52.63	0.366	
2300.0	2328.9	3.405	3.215	34.981	27.850	259.40	-52.30	0.365	
2400.0	2430.8	3.284	3.086	34.972	27.855	260.46	-52.20	0.365	
2500.0	2532.7	3.160	2.954	34.959	27.857	261.62	-52.04	0.365	
2600.0	2634.6	3.041	2.827	34.950	27.861	262.94	-51.67	0.367	
2700.0	2736.6	2.949	2.726	34.945	27.866	263.32	-52.03	0.366	
2800.0	2838.6	2.871	2.640	34.940	27.870	263.93	-52.05	0.366	
2900.0	2940.7	2.793	2.553	34.935	27.874	264.04	-52.56	0.365	
3000.0	3042.8	2.702	2.453	34.929	27.878	264.96	-52.38	0.366	
3100.0	3144.9	2.628	2.371	34.925	27.881	265.30	-52.63	0.365	
3200.0	3247.2	2.541	2.275	34.919	27.884	265.34	-53.30	0.365	
3300.0	3349.4	2.461	2.186	34.914	27.888	265.98	-53.32	0.365	
3400.0	3451.7	2.412	2.127	34.910	27.890	266.24	-53.47	0.365	
3500.0	3554.1	2.355	2.061	34.906	27.891	265.69	-54.49	0.365	
3600.0	3656.5	2.312	2.007	34.902	27.893	265.86	-54.67	0.365	
3700.0	3758.9	2.284	1.969	34.899	27.894	265.70	-55.06	0.365	
3800.0	3861.4	2.264	1.937	34.897	27.894	266.02	-54.92	0.366	
3900.0	3964.0	2.247	1.910	34.895	27.895	265.81	-55.26	0.367	
4000.0	4066.5	2.236	1.888	34.892	27.894	265.21	-55.97	0.367	
4100.0	4169.2	2.230	1.870	34.890	27.894	265.35	-55.87	0.369	

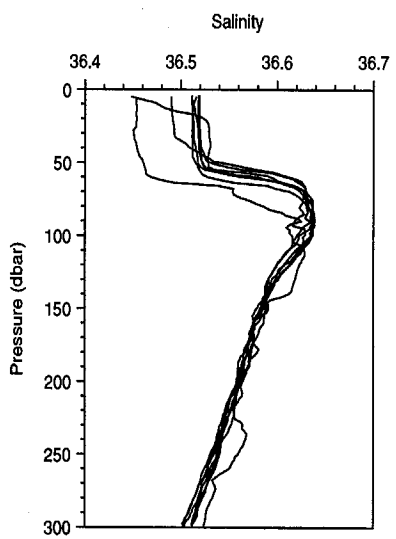
BATS 62—CTD Temperature Profiles



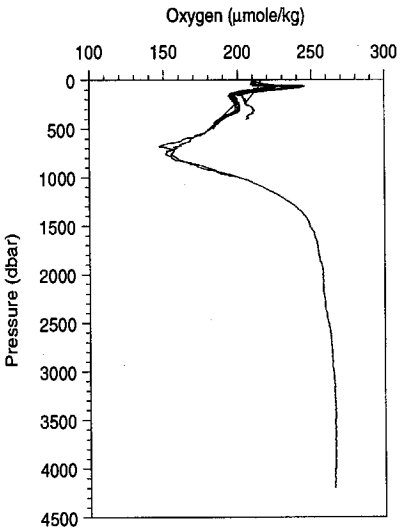


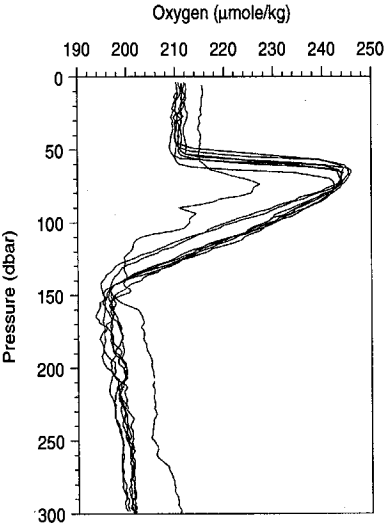
BATS 62—CTD Salinity Profiles



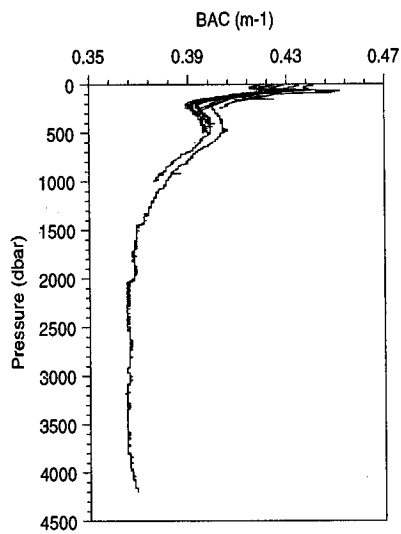


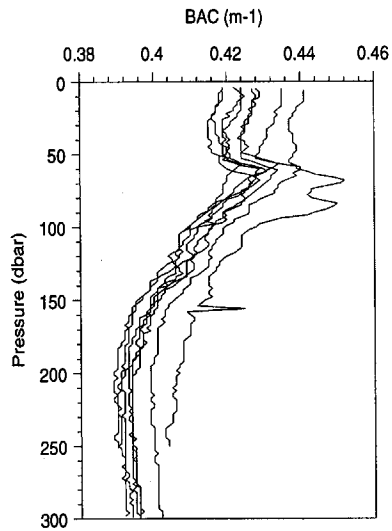
BATS 62—CTD Oxygen Profiles



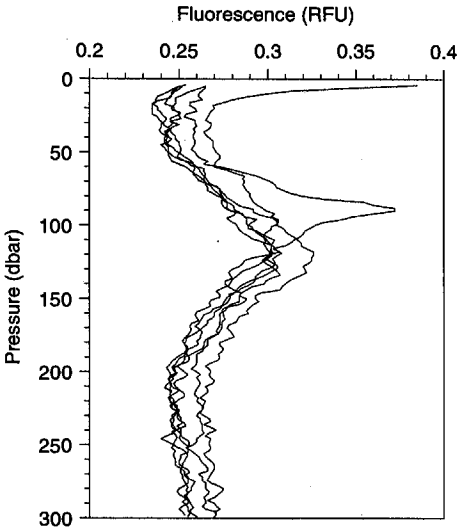


BATS 62—CTD BAC Profiles

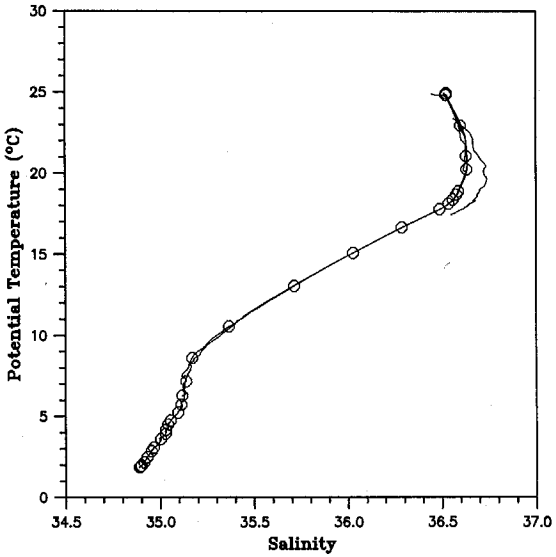




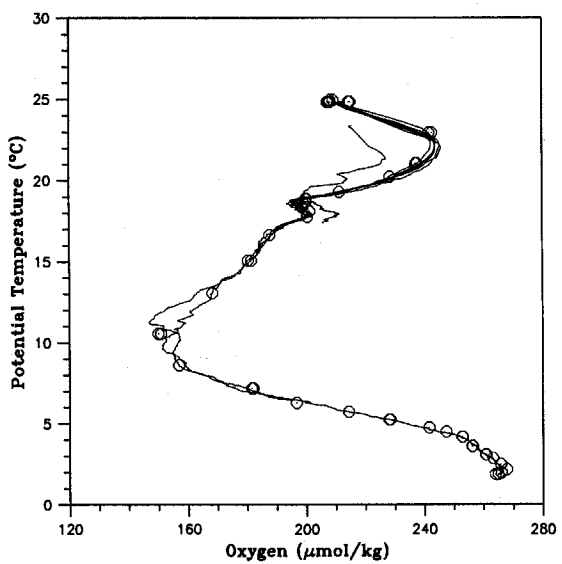
BATS 62—CTD Fluoresence Profiles



BATS 62—T-S Diagram



BATS 62—T-O Diagram



BATS 62—Bottle Data
November 8-12, 1993
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10620302	1.8	1.8	24.949	36.526	24.949		24.513
10620301	2.5	2.5	24.941	36.526	24.940	36.526	24.515
10620304	10.9	11.0	24.847	36.524	24.844		24.543
10620303	11.2	11.3	24.847	36.524	24.844	36.523	24.543
10620306	21.0	21.1	24.838	36.523	24.834		24.545
10620305	21.2	21.4	24.839	36.524	24.834	36.523	24.545
10620307	40.7	41.0	24.837	36.524	24.828	36.524	24.548
10620308	40.8	41.1	24.837	36.524	24.828		24.548
10620310	60.7	61.1	22.975	36.598	22.963		25.158
10620309	60.9	61.3	22.961	36.598	22.948	36.601	25.165
10620312	79.6	80.2	21.054	36.628	21.038		25.725
10620311	80.6	81.2	21.069	36.629	21.053	36.631	25.723
10620314	100.5	101.2	20.246	36.634	20.227		25.950
10620313	100.6	101.3	20.253	36.634	20.234	36.633	25.947
10620316	119.9	120.8	19.333	36.605	19.311		26.169
10620315	120.1	121.0	19.330	36.605	19.308		26.170
10620317	139.4	140.5	18.911	36.589	18.886	36.589	26.267
10620318	139.6	140.6	18.904	36.589	18.879		26.269
10620320	160.3	161.5	18.712	36.580	18.683		26.312
10620319	161.0	162.2	18.698	36.579	18.669	36.580	26.315
10620322	200.2	201.7	18.406	36.561	18.370		26.376
10620321	200.5	202.0	18.403	36.560	18.368	36.559	26.376
10620323	251.0	252.9	18.154	36.538	18.110	36.537	26.423
10620324	251.0	252.9	18.154	36.538	18.110		26.424
10620101	299.8	302.1	17.815	36.489	17.762	36.489	26.473
10620102	397.4	400.6	16.702	36.289	16.636	36.288	26.591
10620103	496.0	500.1	15.147	36.027	15.069	36.028	26.750
10620104	596.3	601.4	13.132	35.714	13.047	35.714	26.937
10620105	695.3	701.4	10.651	35.368	10.564	35.367	27.141
10620106	793.9	801.0	8.689	35.171	8.600	35.171	27.316
10620107	893.2	901.4	7.267	35.140	7.176	35.139	27.504
10620108	991.0	1000.3	6.380	35.118	6.285	35.117	27.609
10620109	1089.6	1100.2	5.822	35.112	5.722	35.112	27.677
10620110	1190.4	1202.2	5.346	35.095	5.240	35.096	27.723
10620111	1287.7	1300.7	4.863	35.056	4.752	35.056	27.748
10620112	1386.2	1400.6	4.613	35.040	4.495	35.041	27.765
10620113	1585.1	1602.3	4.306	35.030	4.172	35.030	27.792
10620114	1781.9	1802.1	4.082	35.028	3.933	35.029	27.816
10620115	1979.9	2003.3	3.760	35.002	3.595	35.003	27.830
10620117	2371.6	2401.9	3.273	34.965	3.077	34.965	27.850
10620118	2573.6	2607.6	3.074	34.952	2.862	34.953	27.860
10620120	2966.1	3008.1	2.734	34.931	2.488	34.931	27.876
10620119	2967.1	3009.2	2.732	34.931	2.486	34.931	27.876
10620121	3347.6	3398.1	2.448	34.913	2.167	34.915	27.890
10620122	3738.3	3798.2	2.273	34.898	1.954	34.899	27.894
10620123	3934.5	3999.3	2.241	34.894	1.900	34.893	27.894
10620124	4130.4	4200.4	2.229	34.890	1.865	34.889	27.894

BATS 62—Bottle Data
November 8-12, 1993
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10620301	2.5	209.42	208.37	9.81	8.76	2028
10620303	11.2	214.64	215.12	14.72	15.20	2028
10620305	21.2	207.84	208.23	7.89	8.28	2029
10620307	40.7	207.44	208.23	7.49	8.27	2027
10620309	60.9	241.84	242.84	35.62	36.63	2035
10620311	80.6	237.81	237.33	24.79	24.31	2045
10620313	100.6		228.58		12.47	2057
10620315	120.1	211.43		-8.33		2075
10620317	139.4	200.27	200.06	-21.19	-21.41	2084
10620319	161.0	200.01	199.18	-22.34	-23.17	2087
10620321	200.5	199.08	198.65	-24.50	-24.94	2088
10620323	251.0	201.38		-23.27		2089
10620101	299.8	200.60		-25.55		
10620102	397.4		187.72		-43.57	
10620103	496.0	180.43	181.48	-58.37	-57.32	
10620104	596.3	168.32		-80.87		
10620105	695.3	150.03	150.90	-113.09	-112.22	
10620106	793.9		156.97		-118.06	
10620107	893.2	182.08	181.60	-101.97	-102.45	
10620108	991.0	196.72		-93.24		
10620109	1089.6		214.37		-79.41	
10620110	1190.4	228.11	228.42	-69.03	-68.72	
10620111	1287.7	241.58		-59.09		
10620112	1386.2		247.36		-55.16	
10620113	1585.1	252.93	252.76	-51.87	-52.05	
10620115	1979.9	256.09	256.26	-52.86	-52.69	
10620117	2371.6	260.65	260.86	-52.13	-51.91	
10620118	2573.6		263.12		-51.22	
10620119	2967.1	265.86	265.73	-51.23	-51.36	
10620121	3347.6		267.78		-51.64	
10620122	3738.3	265.97	266.02	-54.88	-54.84	
10620123	3934.5		264.94		-56.19	
10620124	4130.4	264.94	263.94	-56.30	-57.30	

BATS 62—Bottle Data
November 8-12, 1993
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrate (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10620301	2.5	0.00	0.00	0.00	1.2
10620303	11.2	0.00	0.00	0.00	0.8
10620305	21.2	0.00	0.00	0.00	0.7
10620307	40.7	0.00	0.00	0.00	0.8
10620309	60.9	0.00	0.00	0.00	0.7
10620311	80.6	0.00	0.00	0.00	0.9
10620313	100.6	0.00	0.00	0.00	0.7
10620315	120.1	0.00	0.05	0.00	0.9
10620317	139.4	0.83	0.02	0.00	0.9
10620319	161.0	2.10	0.01	0.10	1.3
10620321	200.5	3.43	0.00	0.18	1.3
10620323	251.0	3.81	0.00	0.21	2.1
10620101	299.8	4.53	0.00	0.24	1.9
10620102	397.4	7.48	0.00	0.44	2.9
10620103	496.0	10.62	0.00	0.65	4.4
10620104	596.3	15.33	0.00	0.97	7.2
10620105	695.3	21.35		1.40	12.2
10620106	793.9	23.56		1.57	14.8
10620107	893.2	22.39		1.48	14.8
10620108	991.0	22.26		1.48	15.6
10620109	1089.6	20.54		1.37	14.5
10620110	1190.4	19.84		1.31	14.1
10620111	1287.7	19.27		1.29	13.5
10620112	1386.2	19.00		1.26	13.9
10620113	1585.1	18.86		1.26	14.6
10620114	1781.9	18.96		1.28	16.6
10620115	1979.9			1.27	18.1
10620117	2371.6	18.60		1.29	20.7
10620118	2573.6	18.68		1.30	21.9
10620120	2966.1	18.68		1.30	24.2
10620119	2967.1	18.60		1.30	24.3
10620121	3347.6	18.80		1.30	26.9
10620122	3738.3	19.33		1.36	31.4
10620123	3934.5	19.70		1.39	33.7
10620124	4130.4	20.23		1.42	35.9

BATS 62—Bottle Data
November 8-12, 1993
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria ($\#x10^8$/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10620302	1.8	21.27	3.47	5.23	0.049	0.000
10620304	10.9	20.97	3.47	5.45	0.059	0.010
10620306	21.0	19.28	3.73	6.01	0.059	0.010
10620308	40.8	28.59	4.32	5.44	0.068	0.000
10620310	60.7	28.82	5.04	7.91	0.117	0.029
10620312	79.6	20.94	3.99	6.04	0.185	0.058
10620314	100.5	16.54	3.66	4.96	0.185	0.068
10620316	119.9	16.79	3.40	4.34	0.146	0.127
10620318	139.6	7.82	1.89	3.73	0.078	0.078
10620320	160.3	9.69	1.36	2.49	0.039	0.068
10620322	200.2	7.51	1.49	2.03	0.019	0.019
10620324	251.0	4.56	0.97	1.79	0.000	0.029
10620101	299.8	4.25	1.29	1.21		
10620102	397.4	6.06	1.43	1.00		
10620103	496.0	4.44	1.10			
10620104	596.3	2.70	0.84			
10620105	695.3	3.26	0.84			
10620106	793.9	4.74	0.97			
10620107	893.2	2.84	0.90			
10620108	991.0	3.74	0.64			
10620109	1089.6			0.60		
10620112	1386.2			0.35		
10620120	2966.1			0.30		
10620123	3934.5			0.25		

BATS 62—Bottle Data
November 8-12, 1993
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10620302	1.8	0	8	5	7	20	0	51	0
10620304	10.9	6	3	5	15	24	0	60	0
10620306	21.0	2	3	5	13	24	0	62	0
10620308	40.8	3	4	5	13	20	0	60	0
10620310	60.7	6	9	5	28	50	0	124	0
10620312	79.6	10	17	5	44	41	0	217	9
10620314	100.5	11	21	5	44	31	47	217	14
10620316	119.9	11	37	5	41	25	115	205	21
10620318	139.6	7	24	5	35	6	75	121	15
10620320	160.3	4	17	5	25	0	49	63	9
10620322	200.2	0	5	5	16	0	11	25	0
10620324	251.0	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad		Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10630402	2.2	3	0	0	0	5	0	0
10630404	10.0	3	0	0	0	5	0	0
10630406	20.9	4	0	0	0	3	0	0
10630408	41.5	1	0	0	0	4	0	0
10630410	58.9	3	0	1	0	4	0	0
10630412	80.1	5	0	0	0	3	0	0
10630414	99.7	7	0	0	0	5	0	1
10630416	120.0	5	0	0	0	2	0	0
10630418	139.9	0	0	0	0	0	0	0
10630420	159.2	0	0	0	0	0	0	0
10630422	198.6	0	0	0	0	0	0	0
10630424	249.2	0	0	0	0	0	0	0

BATS 62: Primary Production and Bacterial Thymidine Uptake

Collection	Primary Production					^{3}H-Thymidine Uptake		
Depth (m)	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	3.88	3.94	3.02	0.37	0.23	0.47	0.49	0.42
20	5.47	4.91	3.70	0.40	0.29	1.25	0.99	0.92
40	3.73	4.53	4.62	0.47	0.19	1.77	1.03	1.07
60	3.43	3.67	3.52	0.35	0.00		1.31	1.41
80	2.34	2.43	2.11	0.22	0.66	0.91	1.00	0.88
100	1.38	1.45	1.13	0.22	0.26	0.37	0.32	0.50
120	0.83	0.72	0.57	0.25	0.48	0.17	0.22	0.13
140	0.44	0.38	0.21	0.17	0.22	0.09	0.11	0.09

BATS 62: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg/m^2/d)	Nitrogen (mg/m^2/d)
150	298	50.89	15.98	3.13
150	299	46.32	9.45	1.37
150	300	35.88	10.96	2.17
200	301	37.19	5.26	0.96
200	302	24.14	5.62	0.67
200	303	30.01	6.89	1.06
300	304	39.15	3.71	0.47
300	305	25.45	6.47	0.72
300	306	30.01	3.65	0.50

BATS 63

Cruise Report
Cruise dates: December 6-10, 1993
Personnel: T. Waterhouse, K. Gundersen, A. Doyle, L. Caporelli, R. Kelly
R/V *Weatherbird II*

6 December 1993

0710 - Depart BBSR.

1432 - Deploy PITs. Lat: 31.748 N; Long: 64.171W

1456 - BBOP cast. Lat: 31.746 N; Long: 64.173 W

1553- **CTD cast 1**, 4200 m cast.
Lat: 31.742 N; Long: 64.178 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
DOC	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
DON	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
POC/PON	top 8 depths
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m

1944 - CTD cast 1 on deck. Lat: 31.746 N; Long: 64.205 W

2016 - BBOP cast. Lat: 31.784 N; Long: 64.179 W

2206 - BBOP cast. Lat: 31.843 N; Long: 64.848 W

7 December 1993

0103 - BBOP cast. Lat: 31.825 N; Long: 64.193 W

0142 - **GoFlo cast #1** (Lipschultz). Lat: 31.829 N; Long: 64.193 W

0510 - **GoFlo cast #2**, 140 m.
Lat: 31.860 N; Long: 64.181 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0637 - Deploy primary production array.
Lat: 31.873 N; Long: 64.193 W

0649 - BBOP cast. Lat: 31.875 N; Long: 64.195 W

0803 - BBOP cast. Lat: 31.906 N; Long: 64.209 W

0825 - **CTD cast 2**, 500 m cast. Calibration cast.

Lat: 31.912 N; Long: 64.210 W

0849 - CTD cast 2 on deck. Lat: 31.918 N; Long: 64.213 W

0851 - **CTD cast 3,** 500 m cast.
Lat: 31.912 N; Long: 64.210 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 250, 250, 250, 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
DOP/POP (Ammerman)	1, 20, 60, 100, 140 and 250 m

0933 - CTD cast 3 on deck. Lat: 31.925 N; Long: 64.213 W

0958 - BBOP cast. Lat: 31.918 N; Long: 64.199 W

1120 - Begin Wakeham pumping. Lat: 31.867 N; Long: 64.187 W

1131 - BBOP cast. Lat: 31.868 N; Long: 64.186 W

1152 - **CTD cast 4**, 500 m cast.
Lat: 31.872 N; Long: 64.189 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
DOC	12 depths
DON	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
POC/PON	12 depths
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	top 11 depths
picoplankton (Olson)	12 depths

1244 - CTD cast 3 on deck. Lat: 31.877 N; Long: 64.190 W

1304 - BBOP cast. Lat: 31.880 N; Long: 64.192 W

1406 - BBOP cast. Lat: 31.882 N; Long: 64.200 W

1428 - End Wakeham pumping. Lat: 31.886 N; Long: 64.198 W

1505 - BBOP cast. Lat: 31.932 N; Long: 64.188 W

1604 - BBOP cast. Lat: 31.942 N; Long: 64.187 W

1629 - **CTD cast 5**, 500 m cast.
Lat: 31.947 N; Long: 64.184 W
Nominal depths: 1, 1, 1, 1, 1, 1, 1, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 60, 150, 200, 200, 200, 200, 300 m.

Samples taken:

RNA/DNA (Giovannoni)	1 and 200 m
bacteria-fixed (Giovannoni)	1, 60, 150, 200, and 300 m

1716 - CTD cast 4 on deck. Lat: 31.955 N; Long: 64.184 W

1736 - BBOP cast. Lat: 31.953 N; Long: 64.199 W

1823 - Recover primary production array.
Lat: 31.961 N; Long: 64.198 W

1857 - BBOP cast. Lat: 31.965 N; Long: 64.195 W

1943 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.953 N; Long: 64.207 W

2005 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.953 N; Long: 64.203 W

2029 - Depart for Station S.

2215 - Arrive Station S.

2231 - **HS 756 CTD cast,** 2600m
Lat: 32.168 N; Long: 64.498 W

8 December 1993

0109 - HS 756 CTD cast on deck. Lat: 32.190 N; Long: 64.486 W

0246 - **CTD cast 6**, 250 m cast.
Lat: 32.201 N; Long: 64.473 W
Nominal depths: 1, 1, 5, 5, 10, 10, 15, 15, 20, 20, 30, 30, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140 m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

0339 - CTD cast 6 on deck. Lat: 32.204 N; Long: 64.464 W

0345 - Depart for BBSR.

0605 - Arrive BBSR

9 December 1993

1200- Depart BBSR.

Personnel: T. Waterhouse, K. Gundersen, K. Elardo, A. Bocconcelli (WHOI), D. Frye (WHOI).

1534 - Plankton tow (Elardo), surface (330 μm net).

1544 - Depart for WHOI Buoy deployment.

2102 - Arrive at WHOI Buoy deployment position. Lat: 32.330 N; Long: 63.236 W

2230 - Buoy deployed. Lat: 32.335 N; Long: 63.268 W

10 December 1993

0710 - Recover PITs. Lat: 32.483 N; Long: 64.208 W

0722 - Plankton tow (Elardo), surface (330 μm net).

0745 - **CTD cast 7**, 250 m cast.
Lat: 32.486 N; Long: 64.208 W
Nominal depths: 1, 1, 5, 5, 10, 10, 15, 15, 20, 20, 30, 30, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140 m.

Samples taken:
dissolved O_2 - replicates 1, 10, 20, 40, 80, 120 m.

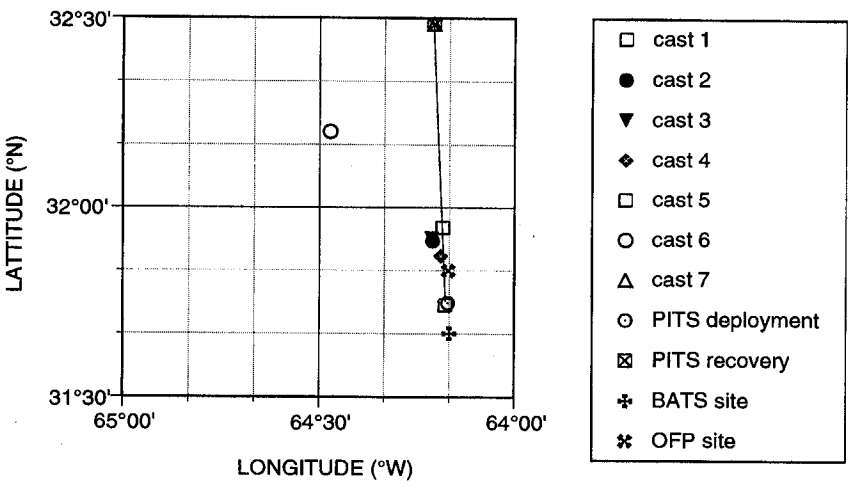
0833 - CTD cast 7 on deck. Lat: 32.493 N; Long: 64.224 W

0835 - Plankton tow (Elardo), surface (330 µm net).

0911 - Depart for BBSR.

1315 - Arrive at BBSR.

Cast positions: BATS 63

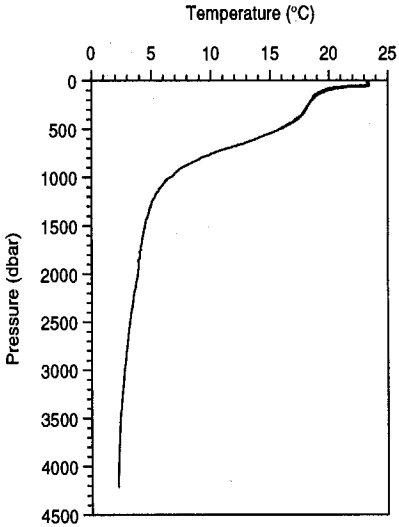


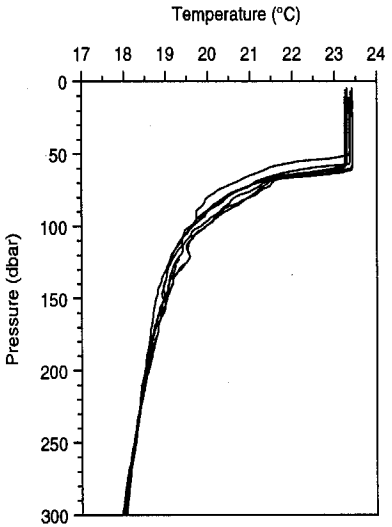
BATS 63, CTD Cast 1
December 6, 1993
Start cast: time: 1553 lat: 31.742 N long: 64.178 W
End cast: time: 1944 lat: 31.746 N long: 64.205 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD O_2 (µmole/kg)	O_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
11.0	11.0	23.337	23.335	36.452	24.940	213.34	8.22		
20.0	20.1	23.345	23.341	36.457	24.941	214.61	9.52		
30.0	30.2	23.346	23.340	36.456	24.941	214.18	9.10		
40.0	40.3	23.355	23.346	36.460	24.942	213.88	8.83		
50.0	50.4	23.367	23.357	36.473	24.949	213.82	8.83		
60.0	60.4	22.302	22.290	36.563	25.325	222.74	14.14		
70.0	70.5	21.062	21.049	36.602	25.702	227.61	14.53		
80.0	80.6	20.404	20.389	36.631	25.904	223.79	8.26		
90.0	90.6	19.970	19.953	36.628	26.018	218.27	1.06		
100.0	100.7	19.624	19.605	36.616	26.101	209.58	-9.00		
110.0	110.8	19.369	19.349	36.609	26.163	206.34	-13.26		
120.0	120.9	19.122	19.100	36.604	26.223	202.84	-17.75		
130.0	131.0	19.019	18.996	36.605	26.251	200.71	-20.29		
140.0	141.0	18.968	18.943	36.615	26.272	198.23	-22.97		
150.0	151.1	18.938	18.910	36.633	26.294	195.02	-26.27		
160.0	161.2	18.842	18.813	36.621	26.310	191.86	-29.84		
170.0	171.3	18.721	18.691	36.606	26.330	193.45	-28.76		
180.0	181.3	18.633	18.601	36.597	26.346	192.63	-29.95		
190.0	191.4	18.570	18.536	36.591	26.357	193.86	-28.98		
200.0	201.5	18.520	18.484	36.586	26.367	194.63	-28.44		
210.0	211.6	18.473	18.436	36.582	26.376	194.74	-28.52		
220.0	221.7	18.424	18.385	36.577	26.385	194.61	-28.86		
230.0	231.7	18.359	18.318	36.567	26.394	196.77	-26.99		
240.0	241.8	18.314	18.271	36.562	26.402	197.29	-26.67		
250.0	251.9	18.277	18.233	36.557	26.408	197.22	-26.89		
275.0	277.1	18.137	18.089	36.539	26.430	197.92	-26.80		
300.0	302.3	18.018	17.965	36.522	26.448	197.41	-27.84		
325.0	327.5	17.918	17.861	36.506	26.462	197.64	-28.05		
350.0	352.7	17.758	17.698	36.479	26.481	194.26	-32.15		
375.0	378.0	17.540	17.475	36.440	26.506	192.30	-35.10		
400.0	403.2	17.297	17.228	36.398	26.533	185.30	-43.22		
425.0	428.4	17.001	16.929	36.343	26.564	185.35	-44.54		
450.0	453.6	16.654	16.579	36.280	26.598	182.63	-48.87		
475.0	478.9	16.223	16.145	36.211	26.647	181.11	-52.44		
500.0	504.1	15.781	15.700	36.136	26.691	178.51	-57.17		
550.0	554.6	14.781	14.696	35.973	26.790	173.37	-67.26		
600.0	605.1	13.767	13.678	35.818	26.888	169.10	-76.72		
650.0	655.6	12.603	12.512	35.637	26.985	159.83	-92.22		
700.0	706.1	11.197	11.107	35.440	27.099	148.38	-111.56		
750.0	756.6	10.005	9.915	35.300	27.201	146.53	-120.41		
800.0	807.2	9.063	8.972	35.225	27.299	152.41	-120.24		
850.0	857.7	8.243	8.151	35.166	27.382	163.51	-114.28		
900.0	908.3	7.421	7.328	35.136	27.480	175.44	-107.63		
950.0	958.9	6.976	6.882	35.129	27.537	186.13	-99.84		
1000.0	1009.4	6.472	6.376	35.110	27.591	197.17	-92.19		
1050.0	1060.0	6.061	5.963	35.097	27.635	207.78	-84.39		
1100.0	1110.7	5.744	5.643	35.100	27.677	216.99	-77.36		
1150.0	1161.3	5.431	5.328	35.089	27.707	224.50	-72.06		
1200.0	1211.9	5.264	5.157	35.088	27.726	230.84	-66.89		
1300.0	1313.2	4.910	4.798	35.061	27.747	240.15	-60.17		
1400.0	1414.6	4.668	4.548	35.047	27.765	246.71	-55.40		

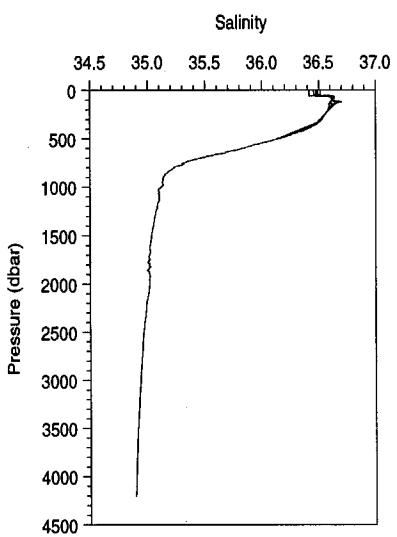
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
500.0	1516.0	4.462	4.335	35.034	27.778	251.74	-51.90		
1600.0	1617.4	4.269	4.135	35.021	27.788	255.01	-50.08		
1700.0	1718.9	4.117	3.975	35.012	27.799	257.14	-49.10		
1800.0	1820.5	4.075	3.923	35.025	27.815	257.45	-49.08		
1900.0	1922.1	3.943	3.784	35.020	27.824	258.06	-49.46		
2000.0	2023.7	3.837	3.669	35.015	27.833	258.03	-50.30		
2100.0	2125.4	3.679	3.504	35.003	27.840	258.85	-50.71		
2200.0	2227.2	3.511	3.328	34.986	27.843	260.18	-50.71		
2300.0	2328.9	3.422	3.232	34.983	27.850	260.56	-51.01		
2400.0	2430.8	3.273	3.074	34.969	27.853	261.55	-51.21		
2500.0	2532.7	3.159	2.952	34.960	27.858	262.37	-51.30		
2600.0	2634.6	3.056	2.841	34.954	27.863	262.86	-51.63		
2700.0	2736.6	2.980	2.757	34.950	27.867	263.20	-51.89		
2800.0	2838.6	2.887	2.655	34.944	27.872	263.66	-52.18		
2900.0	2940.7	2.803	2.563	34.938	27.875	264.42	-52.09		
3000.0	3042.8	2.716	2.467	34.933	27.879	265.05	-52.16		
3100.0	3144.9	2.645	2.387	34.928	27.882	265.32	-52.47		
3200.0	3247.2	2.575	2.307	34.924	27.886	265.50	-52.87		
3300.0	3349.4	2.500	2.224	34.919	27.889	265.85	-53.12		
3400.0	3451.7	2.429	2.144	34.914	27.892	265.69	-53.87		
3500.0	3554.1	2.367	2.072	34.910	27.894	265.83	-54.24		
3600.0	3656.5	2.329	2.024	34.907	27.895	265.63	-54.76		
3700.0	3758.9	2.301	1.985	34.904	27.896	265.38	-55.23		
3800.0	3861.4	2.268	1.942	34.900	27.896	264.96	-55.93		
3900.0	3964.0	2.250	1.913	34.898	27.897	264.72	-56.33		
4000.0	4066.5	2.233	1.885	34.895	27.897	264.43	-56.76		
4100.0	4169.2	2.225	1.865	34.893	27.897	264.22	-57.04		

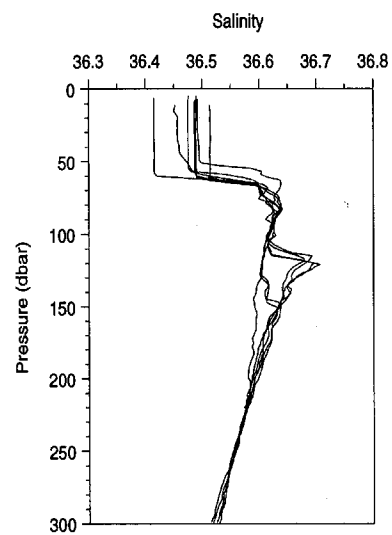
BATS 63—CTD Temperature Profiles



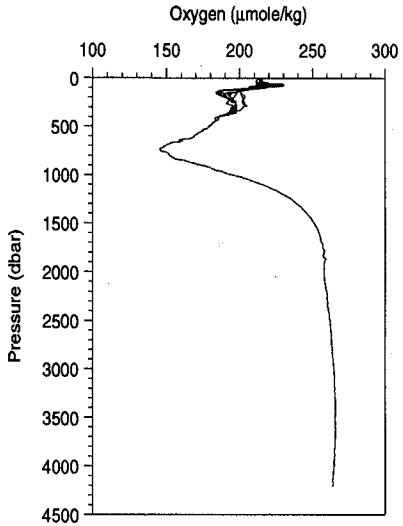


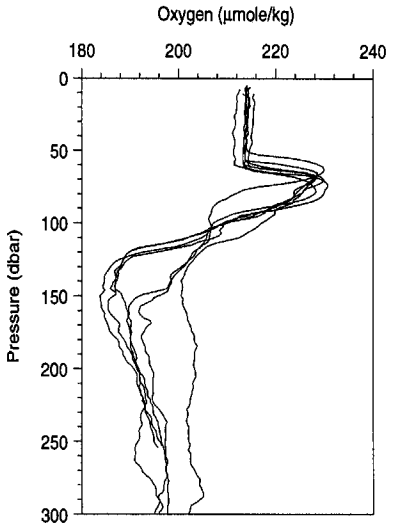
BATS 63—CTD Salinity Profiles



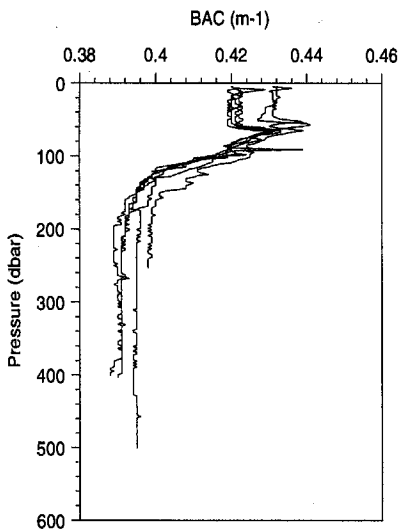


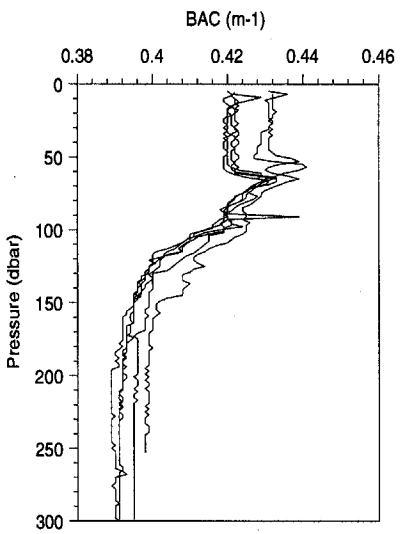
BATS 63—CTD Oxygen Profiles



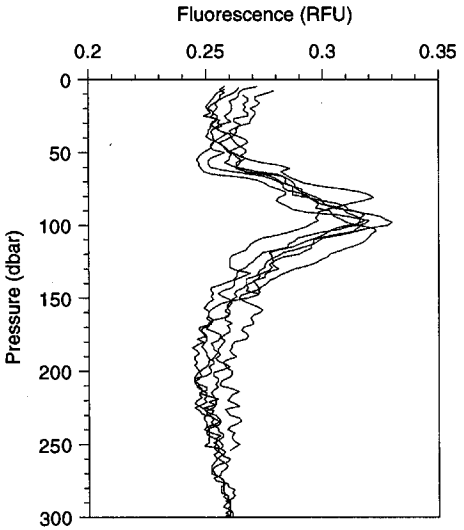


BATS 63—CTD BAC Profiles

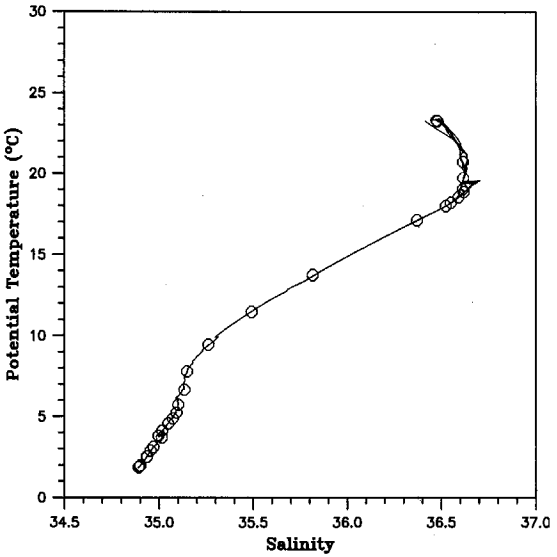




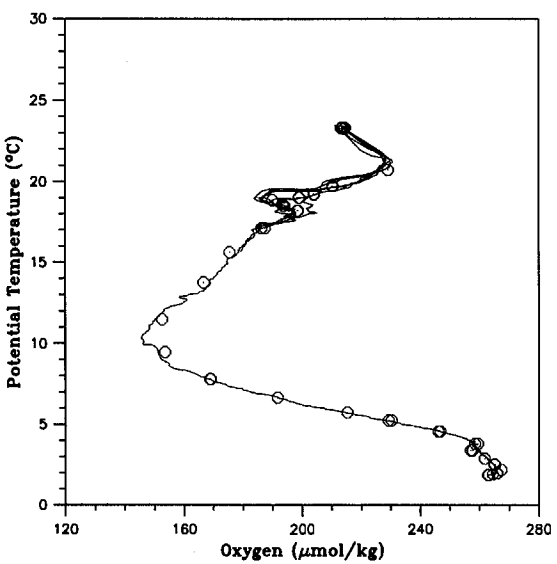
BATS 63— CTD Fluorescence Profiles



BATS 63— T-S Diagram



BATS 63— T-O Diagram



BATS 63—Bottle Data
December 6-10, 1993
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	Sigma$_\theta$ (kg/m^3)
10630401	1.9	1.9	23.296	36.476	23.296	36.478	24.970
10630402	2.2	2.3	23.298	36.476	23.297		24.969
10630404	10.0	10.0	23.296	36.474	23.294		24.968
10630403	10.1	10.2	23.295	36.474	23.293	36.474	24.968
10630406	20.9	21.0	23.296	36.474	23.292		24.969
10630405	21.1	21.3	23.296	36.474	23.292	36.474	24.969
10630407	40.6	40.9	23.297	36.474	23.289	36.474	24.970
10630408	41.5	41.7	23.297	36.474	23.289		24.970
10630410	58.9	59.3	23.264	36.479	23.251		24.984
10630409	60.1	60.5	23.262	36.480	23.250	36.481	24.986
10630412	80.1	80.6	20.744	36.616	20.728		25.800
10630411	80.3	80.9	20.727	36.616	20.711	36.616	25.805
10630414	99.7	100.4	19.724	36.618	19.705		26.076
10630413	99.7	100.4	19.729	36.618	19.710	36.617	26.074
10630416	120.0	120.9	19.239	36.607	19.217		26.195
10630415	120.2	121.1	19.234	36.606	19.212		26.196
10630417	139.5	140.5	19.028	36.614	19.002	36.613	26.255
10630418	139.9	141.0	19.025	36.615	19.000		26.258
10630420	159.2	160.4	18.875	36.621	18.846		26.301
10630419	159.2	160.4	18.878	36.621	18.849	36.620	26.300
10630422	198.6	200.0	18.551	36.592	18.515		26.363
10630421	199.3	200.8	18.550	36.592	18.514	36.590	26.363
10630424	249.2	251.1	18.238	36.553	18.194		26.415
10630423	249.4	251.3	18.237	36.553	18.193	36.551	26.414
10630101	299.4	301.7	18.034	36.523	17.982	36.525	26.446
10630102	399.5	402.6	17.176	36.369	17.108	36.371	26.542
10630103	497.6	501.7	15.692	36.112	15.612		26.693
10630104	594.5	599.5	13.833	35.817	13.746	35.818	26.874
10630105	695.1	701.2	11.567	35.489	11.476	35.492	27.071
10630106	794.8	801.9	9.546	35.262	9.452	35.263	27.250
10630107	891.4	899.6	7.888	35.147	7.793	35.149	27.422
10630108	990.4	999.8	6.753	35.136	6.656	35.135	27.573
10630109	1089.0	1099.6	5.826	35.103	5.726	35.102	27.668
10630110	1189.8	1201.6	5.337	35.090	5.231	35.093	27.722
10630111	1287.0	1300.0	4.984	35.072	4.872	35.073	27.748
10630112	1384.6	1398.9	4.668	35.049	4.550	35.048	27.765
10630113	1584.5	1601.7	4.247	35.018	4.115	35.017	27.788
10630114	1778.8	1799.0	3.937	34.997	3.789	34.996	27.805
10630115	1979.5	2002.9	3.850	35.016	3.684	35.015	27.831
10630116	2176.3	2203.0	3.559	34.992	3.379		27.843
10630117	2372.3	2402.5	3.295	34.971	3.099	34.970	27.852
10630118	2569.0	2603.0	3.085	34.957	2.873	34.955	27.861
10630120	2961.0	3003.0	2.751	34.935	2.505	34.934	27.877
10630119	2961.6	3003.6	2.750	34.935	2.504	34.937	27.880
10630121	3349.3	3399.9	2.459	34.917	2.178		27.890
10630122	3737.4	3797.3	2.288	34.902	1.969	34.900	27.894
10630123	3934.4	3999.2	2.241	34.897	1.900	34.897	27.897
10630124	4133.7	4203.8	2.226	34.893	1.862	34.892	27.896

BATS 63—Bottle Data
December 6-10, 1993
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10620301	2.5	209.42	208.37	9.81	8.76	2028
10630401	1.9	213.50		8.27		2028
10630403	10.1	213.58	214.59	8.35	9.35	2028
10630405	21.1	213.63	213.41	8.40	8.18	2028
10630407	40.6	213.54	213.24	8.31	8.01	2028
10630409	60.1	214.19	214.27	8.85	8.93	2028
10630411	80.3	229.16		14.83		2055
10630413	99.7	210.30	210.51	-7.87	-7.65	2074
10630415	120.2	203.97	204.23	-16.18	-15.92	2081
10630417	139.5	198.95	199.13	-22.00	-21.83	2089
10630419	159.2	189.94		-31.61		2096
10630421	199.3	194.02	193.54	-28.91	-29.39	2094
10630423	249.4	198.67	198.41	-25.61	-25.87	2091
10630102	399.5	186.26	187.39	-42.82	-41.69	
10630103	497.6	175.46		-60.67		
10630104	594.5	166.61		-78.88		
10630105	695.1		152.58		-105.24	
10630106	794.8	153.56		-116.14		
10630107	891.4	168.82	169.04	-111.24	-111.02	
10630108	990.4		191.67		-95.75	
10630109	1089.0	215.28		-78.50		
10630110	1189.8	229.26	230.26	-67.96	-66.96	
10630112	1384.6	246.09	246.74	-56.01	-55.36	
10630114	1778.8	258.51	259.46	-49.13	-48.17	
10630116	2176.3	257.08	257.64	-53.42	-52.86	
10630118	2569.0	261.78	261.73	-52.48	-52.52	
10630120	2961.0	265.27	265.05	-51.67	-51.88	
10630121	3349.3		267.44		-51.87	
10630122	3737.4	265.80	266.01	-54.93	-54.71	
10630123	3934.4		264.48		-56.64	
10630124	4133.7	263.15	262.85	-58.10	-58.41	

BATS 63—Bottle Data
December 6-10, 1993
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10630401	1.9	0.00	0.00	0.10	0.8
10630403	10.1	0.00	0.00	0.05	0.8
10630405	21.1	0.00	0.00	0.05	0.8
10630407	40.6	0.00	0.00	0.00	0.8
10630409	60.1	0.00	0.00	0.08	0.8
10630411	80.3	0.00	0.00	0.06	0.7
10630413	99.7	0.26	0.05	0.00	0.8
10630415	120.2	0.37	0.00	0.00	0.9
10630417	139.5	1.89	0.00	0.10	1.1
10630419	159.2		0.00		1.2
10630421	199.3	3.45	0.00	0.17	1.3
10630423	249.4	3.27	0.00	0.15	1.6
10630101	299.4	3.98	0.00	0.18	1.6
10630102	399.5	6.89	0.00	0.40	2.6
10630103	497.6	10.36	0.00	0.62	4.1
10630104	594.5	14.36	0.00	0.85	6.3
10630105	695.1	19.90	0.00	1.24	10.2
10630106	794.8	22.48	0.00	1.43	13.4
10630107	891.4	23.03	0.00	1.50	15.1
10630108	990.4	22.04	0.00	1.42	15.2
10630109	1089.0	20.34	0.00	1.34	14.4
10630110	1189.8	18.86	0.00	1.24	14.1
10630111	1287.0	16.88	0.00	1.11	13.9
10630112	1384.6	17.98	0.00	1.21	14.6
10630113	1584.5	18.63	0.00	1.30	15.2
10630114	1778.8		0.00		16.2
10630115	1979.5	18.85	0.00	1.24	19.1
10630116	2176.3	18.79	0.00	1.29	20.7
10630117	2372.3	18.73	0.00	1.23	22.0
10630118	2569.0	18.68	0.00	1.31	22.3
10630120	2961.0	18.24	0.00	1.32	24.0
10630119	2961.6	18.35	0.00		24.2
10630121	3349.3	18.29	0.00	1.30	27.0
10630122	3737.4	18.73	0.00	1.34	31.4
10630123	3934.4	19.01	0.00	1.40	33.9
10630124	4133.7	19.33	0.00	1.35	36.0

BATS 63—Bottle Data
December 6-10, 1993
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10630402	2.2	26.15	4.79	3.66	0.039	0.000
10630404	10.0	23.80	4.25	4.01	0.039	0.010
10630406	20.9	24.48	4.65	4.99	0.049	0.000
10630408	41.5	23.63	3.98	3.87	0.049	0.000
10630410	58.9	20.84	3.84	4.65	0.088	0.000
10630412	80.1	21.07	4.11	3.96	0.136	0.058
10630414	99.7	18.40	3.56	3.03	0.068	0.166
10630416	120.0	14.24	2.62	2.47	0.078	0.058
10630418	139.9	11.31	1.88	2.14	0.029	0.039
10630420	159.2	10 23	1.36	1.01	0.010	0.019
10630422	198.6	9.06	0.90	1.37	0.000	0.010
10630424	249.2			1.12	0.000	0.000
10630101	299.4	8.16	1.68	0.89		
10630102	399.5	7.94	1.61	0.95		
10630103	497.6	5.89	1.47			
10630104	594.5	6.27	1.34			
10630105	695.1	7.09	1.07			
10630106	794.8	5.59	0.66			
10630107	891.4	8.42	1.00			
10630108	990.4	4.72	0.86			
10630109	1089.0			0.43		
10630112	1384.6			0.28		
10630120	2961.0			0.22		
10630123	3934.4			0.17		

BATS 63—Bottle Data
December 6-10, 1993
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10630402	2.2	3	8	5	19	25	0	83	0
10630404	10.0	3	8	5	22	29	0	87	5
10630406	20.9	3	9	5	21	29	5	90	3
10630408	41.5	4	11	5	21	31	9	96	6
10630410	58.9	7	12	5	29	30	8	115	5
10630412	80.1	12	19	5	48	38	38	216	18
10630414	99.7	13	41	5	51	18	105	220	18
10630416	120.0	8	22	5	30	7	73	124	13
10630418	139.9	0	3	5	9	0	36	77	5
10630420	159.2	0	5	5	17	0	17	27	0
10630422	198.6	0	0	5	6	0	0	10	0
10630424	249.2	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad		Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10630402	2.2	3	0	0	0	5	0	0
10630404	10.0	3	0	0	0	5	0	0
10630406	20.9	4	0	0	0	3	0	0
10630408	41.5	1	0	0	0	4	0	0
10630410	58.9	3	0	1	0	4	0	0
10630412	80.1	5	0	0	0	3	0	0
10630414	99.7	7	0	0	0	5	0	1
10630416	120.0	5	0	0	0	2	0	0
10630418	139.9	0	0	0	0	0	0	0
10630420	159.2	0	0	0	0	0	0	0
10630422	198.6	0	0	0	0	0	0	0
10630424	249.2	0	0	0	0	0	0	0

BATS 63: Primary Production and Bacterial Thymidine Uptake

Collection	Primary Production					^{3}H-Thymidine Uptake		
Depth (m)	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	4.94	5.26	4.45	0.36	0.44	0.48	0.25	0.40
20	4.41	3.99	5.31	0.34	0.42	0.63	0.68	0.81
40	3.87		3.03	0.45	0.50	0.77	0.73	0.62
60	3.79	3.92	3.78	0.35	0.42	0.78	0.86	0.80
80	1.43	1.98		0.28	0.61	0.57	0.54	0.61
100	0.75	0.93	1.02	0.46	0.48	0.20	0.18	0.15
120	0.51	0.44	0.44	0.23	0.47	0.11	0.18	0.14
140	0.28	0.33	0.30	0.26	0.41	0.06	0.07	0.06

BATS 63: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	307	32.66	9.70	1.86
150	308	39.61	8.30	1.16
150	309	34.05	8.05	1.33
200	310	86.16	15.87	1.88
200	311	25.02	7.34	1.20
200	312	15.98	2.80	0.34
300	313	20.15	4.34	0.89
300	314	23.63	5.08	0.72
300	315	20.85	4.22	0.67

BATS 64

Cruise Report

Cruise dates: January 11-18, 1994

Personnel: F. Howse, R. Kelly, F. Bahr, R. Little, P. Countway, L. Banghart, R. Phyliky, C. Carlson.

R/V *Weatherbird II*

11 January 1994

1915- Depart BBSR.

12 January 1994

0100 - Arrive at BATS.

0129 - BBOP cast. Lat: 31.746 N; Long: 64.173 W

0206 - **GoFlo cast #1** (Lipschultz). Lat: 31.739 N; Long: 64.185 W

0335 - **GoFlo cast #2**, 140 m.
Lat: 31.749 N; Long: 64.168 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0545 - Deploy PITs. Lat: 31.727 N; Long: 64.182 W

0653 - Deploy primary production array.
Lat: 31.716 N; Long: 64.187 W

0700 - BBOP cast. BBOP unit failed.

0759 - **CTD cast 1**, 500 m cast. yo-yo calibration cast.
Lat: 31.712 N; Long: 64.192 W

0834 - **CTD cast 2**, 500 m cast.
Lat: 31.709 N; Long: 64.195 W
Nominal depths: 1, 1, 1, 1, 1, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 200, 250, 500 m.

Samples taken:

Total Thorium (Buesseler)	top 16 depths
DOC (Carlson)	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 250 and 500 m
AODC (Carlson)	1, 10, 20, 40, 60, 80, 100, 120, 150, 200, 250 and 500 m
TDR (Carlson)	1, 10, 20, 40, 60, 80, 100, 150, 200, 250 and 500 m
^{3}H-Leucine (Carlson)	1, 10, 20, 40, 60, 80, 100, 150, 200, 250 and 500 m

0944 - CTD cast 2 on deck. Lat: 31.703 N; Long: 64.196 W

1105 - **CTD cast 3**, 500 m cast.
Lat: 31.678 N; Long: 64.218 W

Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 250, 250, 250 and 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
DOP/POP (Ammerman)	1, 20, 60, 100, 140 and 250 m

1158 - CTD cast 3 on deck. Lat: 31.675 N; Long: 64.223 W

1311 - **CTD cast 4**, 500 m cast.
Lat: 31.659 N; Long: 64.246 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	top 11 depths
picoplankton (Olson)	12 depths

1345 - Begin Wakeham pumping.

1410 - CTD cast 4 on deck. Lat: 31.649 N; Long: 64.253 W

1617 - BBOP cast. Lat: 31.631 N; Long: 64.273 W

1735 - End Wakeham pumping.

1838 - Recover primary production array.
Lat: 31.608 N; Long: 64.298'W

1849 - **CTD cast 5**, 500 m cast.
Lat: 31.609 N; Long: 64.297 W
Nominal depths: 1, 1, 1, 1, 1, 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 200, 250, 500 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths

2010 - CTD cast 5 on deck. Lat: 31.606 N; Long: 64.294 W

2052 - BBOP cast. Lat: 31.601 N; Long: 64.297 W

2122 - **CTD cast 6**, 500 m cast.
Lat: 31.598 N; Long: 64.292 W
Nominal depths: 1, 1, 1, 1, 1, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 60, 150, 200, 200, 200, 200, 300 m.

Samples taken:

RNA/DNA (Giovannoni)	1 and 200 m.
bacteria (Giovannoni)	1, 60, 150, 200 and 300 m.

2214 - CTD cast 6 on deck. Lat: 31.599 N; Long: 64.287 W

2324 - **CTD cast 7**, 4200 m cast.
Lat: 31.609 N; Long: 64.338 W
Nominal depths: 400, 500, 600, 700, 800, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
DOC	400, 500, 700, 800, 800, 900, 3000 and 4000 m
DON	400, 500, 700, 800, 800, 900, 3000 and 4000 m
POC/PON	top 8 depths
PSi	top 8 depths
bacterial abundance	400, 500, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	400, 500, and 600 m.
total thorium (Buesseler)	3400, 3800, 4000, and 4200 m.

13 January 1994

0318 - CTD cast 7 on deck. Lat: 31.599 N; Long: 64.314 W

0348 - Depart for Hydrostation S.

0819 - **HS 758 CTD cast,** 2600 m
Lat: 32.163 N; Long: 64.503 W

1100 - HS 758 CTD cast on deck. Lat:32.142 N; Long: 64.510 W

1120 - **GoFlo cast #3** (Lipschultz). Lat: 32.136 N; Long: 64.518 W

1253 - **CTD cast 8**, 500 m cast.
Lat: 31.170 N; Long: 64.500 W
Nominal depths: 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,15, 20, 30, 40, 60, 80, 100, 120, 140 m.

Samples taken:
none due to accident with CTD

1333 - CTD cast 8 on deck. Lat: 31.165 N; Long: 64.495 W

1350 - Depart for BBSR.

1610 - Arrive BBSR.

17 January 1994

0810 - Depart BBSR.

1925 - Recover PITs. Lat: 30.923 N; Long: 64.511 W

1945- **CTD cast 9**, 500 m cast.
Lat: 30.920 N; Long: 64.497 W
Nominal depths: 1, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 200, 250, 500, 500, 500, 500 m.

Samples taken:

Total Thorium (Buesseler)	1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 m.

2109 - CTD cast 9 on deck. Lat: 30.917 N; Long: 64.486 W

2115 - Depart for Hydrostation S.

18 January 1994

0530 - Arrive at Hydrostation S

0551 - **CTD cast 10**, 250 m cast.
Lat: 32.166 N; Long: 64.503 W
Nominal depths: 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 15, 20, 30, 40, 60, 80, 100, 120, 140, 150, 200, 250, 500 m.

Samples taken:

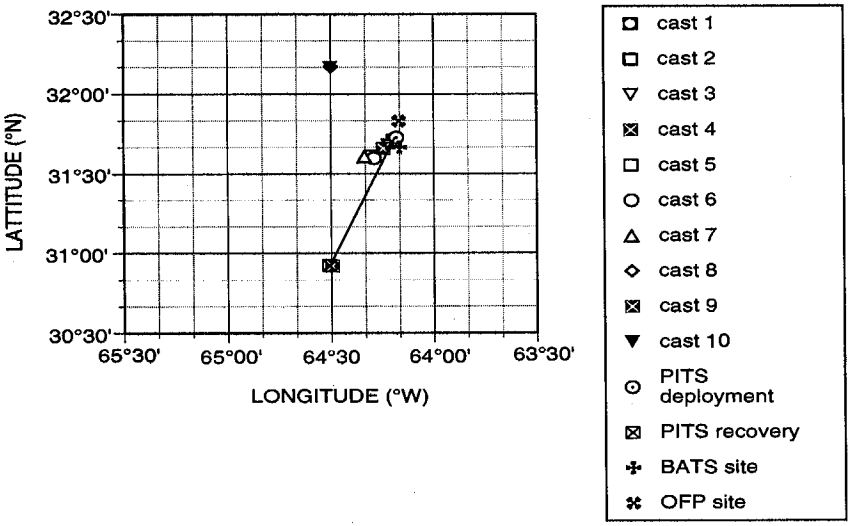
DMS (Dacey)	12 depths
sDMSP (Dacey)	12 depths
DOC (Carlson)	1, 5, 10, 20, 30, 60, 100, 140, 200, and 500 m

0704 - CTD cast 10 on deck. Lat: 32.162 N; Long: 64.510 W

0715 - Depart for BBSR.

0937 - Arrive at BBSR.

Cast positions: BATS 64

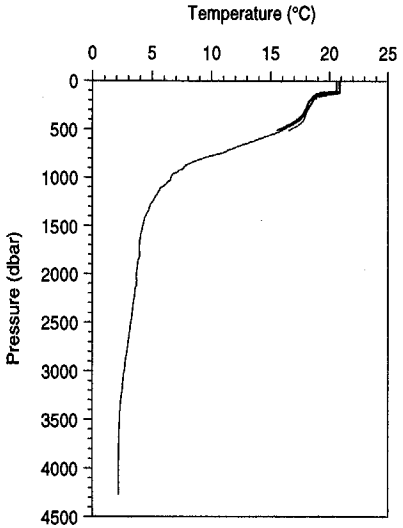


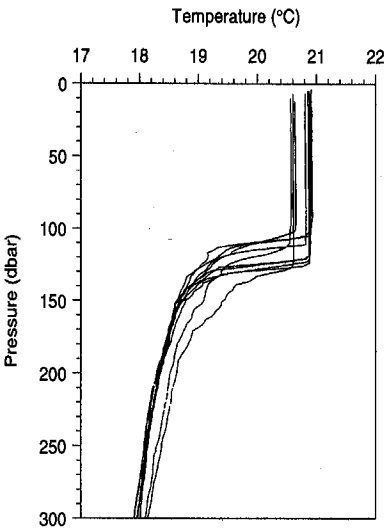
BATS 64, CTD Cast 7
January 13, 1994
Start cast: time: 2324 lat: 31.609 N long: 64.338 W
End cast: time: 0318 lat: 31.599 N long: 64.314 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
7.0	7.0	20.809	20.808	36.546	25.726	223.16	9.03		
10.0	10.1	20.809	20.807	36.546	25.726	222.96	8.84		
20.0	20.1	20.806	20.802	36.547	25.727	222.78	8.65		
30.0	30.2	20.809	20.803	36.547	25.727	222.68	8.56		
40.0	40.3	20.814	20.806	36.547	25.726	222.66	8.56		
50.0	50.4	20.818	20.808	36.547	25.726	222.54	8.45		
60.0	60.4	20.819	20.807	36.547	25.726	222.64	8.55		
70.0	70.5	20.822	20.808	36.547	25.726	222.33	8.25		
80.0	80.6	20.825	20.809	36.547	25.726	222.63	8.57		
90.0	90.6	20.827	20.810	36.547	25.726	222.31	8.26		
100.0	100.7	20.828	20.809	36.547	25.726	222.20	8.15		
110.0	110.8	20.826	20.805	36.548	25.727	221.58	7.53		
120.0	120.9	19.374	19.352	36.590	26.147	212.70	-6.92		
130.0	131.0	19.117	19.093	36.588	26.213	207.67	-12.97		
140.0	141.0	18.839	18.813	36.578	26.277	204.39	-17.39		
150.0	151.1	18.620	18.593	36.557	26.317	206.04	-16.66		
160.0	161.2	18.555	18.527	36.567	26.341	205.48	-17.47		
170.0	171.3	18.529	18.499	36.571	26.351	205.47	-17.58		
180.0	181.3	18.500	18.468	36.575	26.363	206.06	-17.10		
190.0	191.4	18.420	18.386	36.563	26.374	206.30	-17.21		
200.0	201.5	18.320	18.284	36.549	26.389	206.86	-17.09		
210.0	211.6	18.275	18.238	36.547	26.399	207.17	-16.96		
220.0	221.7	18.237	18.198	36.545	26.408	207.27	-17.03		
230.0	231.7	18.190	18.150	36.540	26.416	207.73	-16.77		
240.0	241.8	18.159	18.117	36.537	26.422	208.86	-15.77		
250.0	251.9	18.121	18.077	36.534	26.430	209.32	-15.47		
275.0	277.1	18.032	17.984	36.526	26.447	210.67	-14.52		
300.0	302.3	17.969	17.917	36.518	26.457	211.00	-14.45		
325.0	327.5	17.864	17.807	36.503	26.473	210.55	-15.37		
350.0	352.7	17.736	17.675	36.482	26.489	209.53	-16.96		
375.0	378.0	17.582	17.517	36.453	26.506	208.35	-18.85		
400.0	403.2	17.284	17.216	36.395	26.534	202.61	-25.96		
425.0	428.4	16.940	16.868	36.330	26.568	198.78	-31.40		
450.0	453.6	16.587	16.512	36.265	26.603	194.90	-36.94		
475.0	478.9	16.356	16.278	36.225	26.627	192.23	-40.69		
500.0	504.1	16.019	15.937	36.165	26.660	190.32	-44.22		
550.0	554.6	15.019	14.934	35.997	26.756	183.45	-56.00		
600.0	605.1	13.841	13.753	35.812	26.868	175.92	-69.54		
650.0	655.6	12.645	12.555	35.632	26.972	166.04	-85.80		
700.0	706.1	11.532	11.440	35.482	27.070	156.76	-101.27		
750.0	756.6	10.492	10.399	35.354	27.160	159.48	-104.57		
800.0	807.2	9.074	8.983	35.218	27.292	160.85	-111.75		
850.0	857.7	8.071	7.980	35.158	27.401	168.17	-110.71		
900.0	908.3	7.598	7.505	35.141	27.458	178.51	-103.40		
950.0	958.9	6.820	6.726	35.115	27.547	191.51	-95.52		
1000.0	1009.4	6.580	6.483	35.138	27.599	203.31	-85.26		
1050.0	1060.0	6.227	6.127	35.127	27.637	210.57	-80.40		
1100.0	1110.7	5.667	5.567	35.087	27.676	219.81	-75.11		
1150.0	1161.3	5.459	5.355	35.089	27.704	227.65	-68.71		
1200.0	1211.9	5.209	5.103	35.083	27.729	234.04	-64.10		
1300.0	1313.2	4.773	4.662	35.038	27.745	245.24	-56.12		

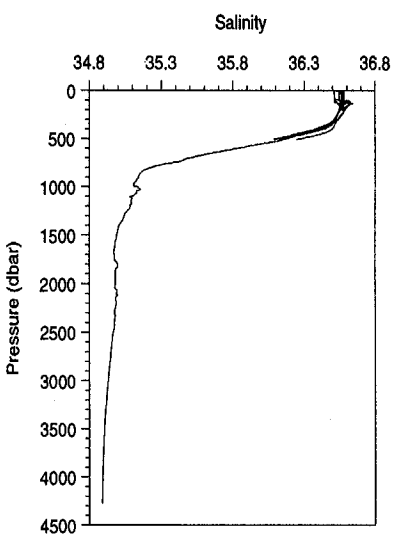
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.390	4.273	35.002	27.759	252.44	-51.81		
1500.0	1516.0	4.199	4.075	34.988	27.769	257.39	-48.31		
1600.0	1617.4	4.032	3.901	34.978	27.779	261.17	-45.79		
1700.0	1718.9	3.930	3.791	34.973	27.787	262.99	-44.75		
1800.0	1820.5	3.947	3.797	34.997	27.805	262.11	-45.45		
1900.0	1922.1	3.755	3.598	34.980	27.812	263.53	-45.51		
2000.0	2023.7	3.670	3.505	34.979	27.820	264.00	-45.69		
2100.0	2125.4	3.672	3.497	34.993	27.832	262.40	-47.24		
2200.0	2227.2	3.527	3.344	34.985	27.840	262.67	-48.10		
2300.0	2328.9	3.412	3.222	34.979	27.848	263.11	-48.54		
2400.0	2430.8	3.305	3.107	34.974	27.854	262.71	-49.79		
2500.0	2532.7	3.159	2.952	34.961	27.858	263.52	-50.15		
2600.0	2634.6	3.067	2.852	34.955	27.863	264.36	-50.04		
2700.0	2736.6	2.968	2.745	34.948	27.867	264.75	-50.44		
2800.0	2838.6	2.847	2.616	34.941	27.873	265.52	-50.63		
2900.0	2940.7	2.738	2.499	34.934	27.878	266.33	-50.71		
3000.0	3042.8	2.624	2.377	34.928	27.883	266.88	-51.08		
3100.0	3144.9	2.543	2.287	34.923	27.886	267.21	-51.42		
3200.0	3247.2	2.461	2.196	34.917	27.890	267.20	-52.09		
3300.0	3349.4	2.359	2.086	34.910	27.893	267.30	-52.84		
3400.0	3451.7	2.302	2.020	34.906	27.895	266.70	-53.91		
3500.0	3554.1	2.276	1.983	34.903	27.896	266.67	-54.15		
3600.0	3656.5	2.247	1.943	34.901	27.897	266.34	-54.73		
3700.0	3758.9	2.221	1.908	34.898	27.897	265.89	-55.39		
3800.0	3861.4	2.207	1.882	34.895	27.897	265.13	-56.27		
3900.0	3964.0	2.193	1.858	34.893	27.897	264.30	-57.22		
4000.0	4066.5	2.190	1.843	34.891	27.897	263.72	-57.83		
4100.0	4169.2	2.192	1.833	34.890	27.897	263.02	-58.52		
4200.0	4271.8	2.196	1.825	34.889	27.896	262.28	-59.22		

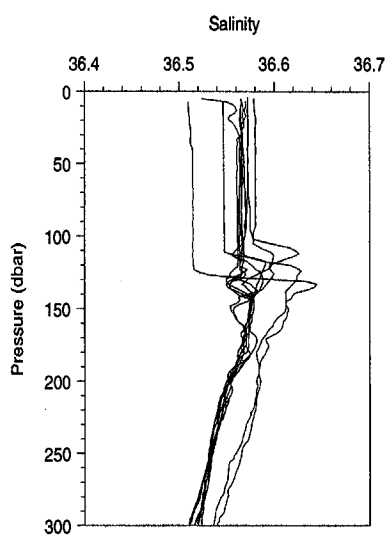
BATS 64—CTD Temperature Profiles



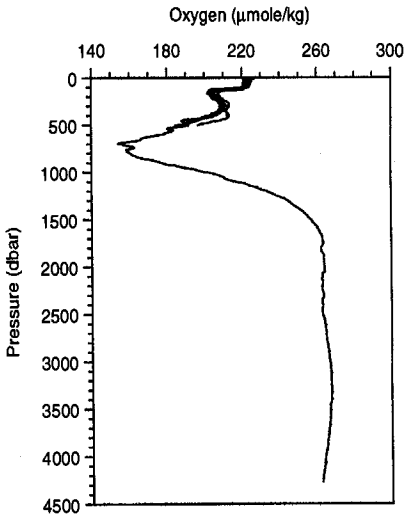


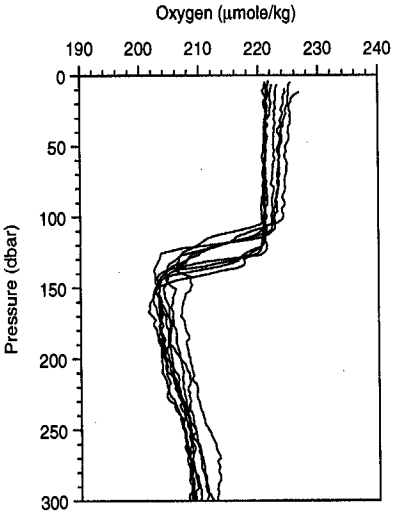
BATS 64—CTD Salinity Profiles



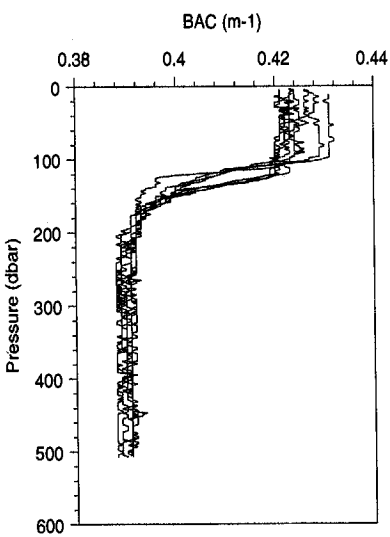


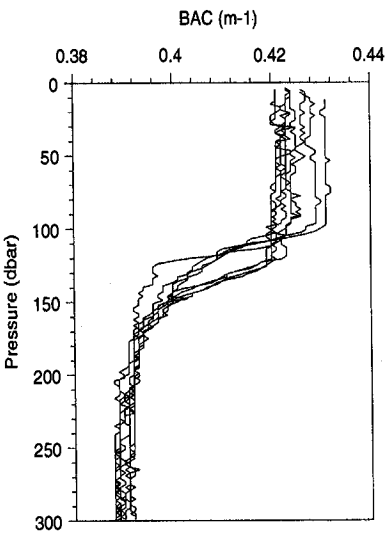
BATS 64—CTD Oxygen Profiles



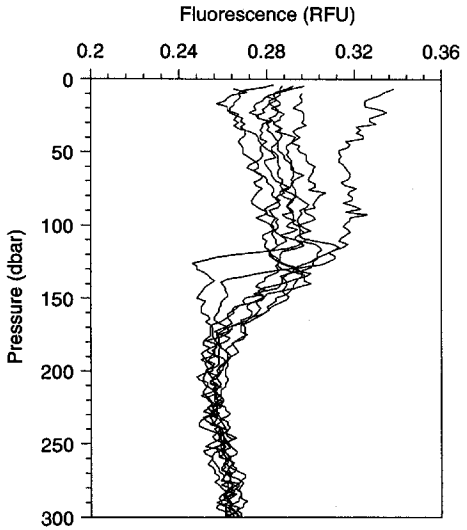


BATS 64—CTD BAC Profiles

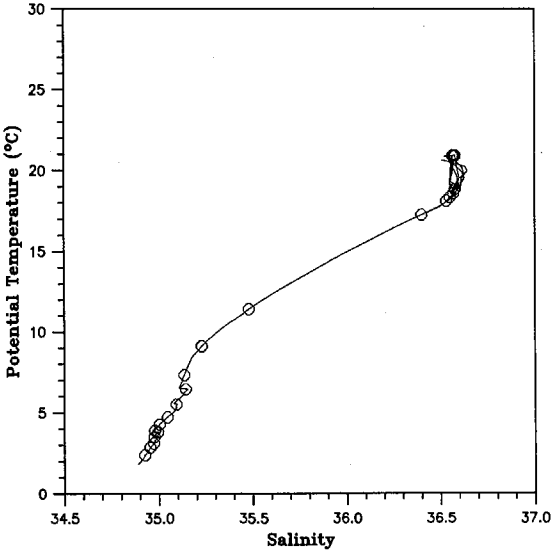




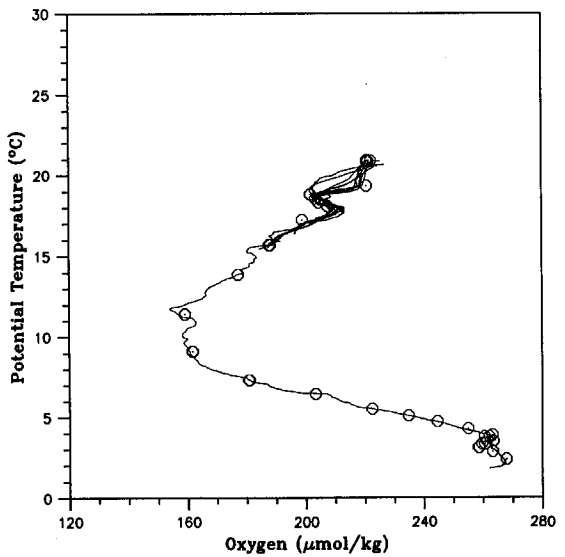
BATS 64—CTD Fluorescence Profiles



BATS 64—T-S Diagram



BATS 64—T-O Diagram



BATS 64—Bottle Data
January 11-18, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10640401	2.0	2.1	20.905	36.573	20.904	36.578	25.724
10640402	2.2	2.2	20.908	36.573	20.907		25.719
10640404	10.2	10.3	20.913	36.573	20.911		25.718
10640403	10.3	10.4	20.912	36.573	20.910	36.572	25.717
10640405	20.4	20.5	20.912	36.572	20.908	36.571	25.717
10640406	20.5	20.6	20.912	36.573	20.909		25.718
10640408	39.9	40.2	20.888	36.567	20.881		25.722
10640407	40.3	40.6	20.890	36.568	20.882	36.567	25.721
10640409	59.8	60.2	20.889	36.566	20.877	36.579	25.732
10640410	60.3	60.7	20.889	36.566	20.877		25.722
10640412	79.7	80.2	20.886	36.565	20.871		25.723
10640411	80.3	80.8	20.886	36.565	20.871		25.722
10640413	100.1	100.8	20.889	36.565	20.869	36.565	25.723
10640414	100.4	101.1	20.891	36.565	20.871		25.723
10640416	120.2	121.1	19.490	36.559	19.468		26.093
10640415	120.6	121.5	19.362	36.561	19.340		26.128
10640418	140.0	141.1	18.850	36.579	18.825		26.275
10640417	140.2	141.2	18.837	36.578	18.812	36.579	26.278
10640420	160.8	162.0	18.592	36.572	18.563		26.336
10640419	161.2	162.3	18.592	36.572	18.563	36.571	26.335
10640421	200.2	201.7	18.352	36.552	18.317	36.552	26.383
10640422	200.4	201.9	18.351	36.552	18.316		26.383
10640424	251.5	253.4	18.142	36.534	18.098		26.425
10640423	251.5	253.4	18.141	36.534	18.097	36.533	26.423
10640701	404.4	407.7	17.315	36.401	17.246	36.400	26.531
10640702	507.6	511.8	15.769	36.124	15.687		26.685
10640703	598.1	603.1	13.958	35.832	13.869		26.858
10640704	699.0	705.1	11.511	35.480	11.420	35.479	27.072
10640706	800.1	807.3	9.200	35.228	9.108	35.229	27.280
10640705	800.8	808.0	9.209	35.228	9.116	35.226	27.277
10640707	903.8	912.1	7.418	35.137	7.325	35.135	27.480
10640708	1002.2	1011.7	6.543	35.142	6.446	35.142	27.607
10640709	1103.4	1114.1	5.607	35.092	5.507	35.093	27.688
10640710	1201.6	1213.5	5.196	35.082	5.090		27.730
10640711	1294.8	1307.9	4.828	35.047	4.717	35.046	27.745
10640712	1409.9	1424.6	4.384	35.004	4.267	35.003	27.760
10640713	1595.3	1612.7	4.012	34.976	3.881	34.977	27.781
10640714	1801.3	1821.8	3.930	34.996	3.781	34.995	27.805
10640715	1998.5	2022.2	3.653	34.977	3.489	34.976	27.819
10640716	2199.2	2226.4	3.503	34.984	3.321		27.842
10640717	2397.2	2427.9	3.299	34.975	3.101	34.972	27.854
10640718	2597.0	2631.5	3.059	34.955	2.845	34.952	27.861
10640720	3003.5	3046.4	2.622	34.928	2.375	34.925	27.881
10640719	3003.9	3046.8	2.621	34.928	2.374		27.883

BATS 64—Bottle Data
January 11-18, 1994
Gases

Bottle ID	Depth (m)	O_2(1) (µmole/kg)	O_2(2) (µmole/kg)	O_2(1) anomaly (µmole/kg)	O_2(2) anomaly (µmole/kg)	TCO_2 (µmole/kg)
10640401	2.0	222.23	220.75	8.51	7.03	2039
10640403	10.3	220.97	221.15	7.28	7.45	2038
10640405	20.4	221.05	220.97	7.36	7.27	2037
10640407	40.3	221.00	221.05	7.22	7.26	2038
10640409	59.8	220.96	220.82	7.17	7.04	2040
10640411	80.3	221.13	220.74	7.33	6.94	2037
10640413	100.1	220.96	221.39	7.16	7.60	2038
10640415	120.6	220.81	220.72	1.10	1.01	2064
10640417	140.2	201.90	201.68	-19.88	-20.10	
10640419	161.2	203.58	203.45	-19.21	-19.34	2080
10640421	200.2	204.72	204.54	-19.09	-19.27	2084
10640423	251.5	207.59	207.50	-17.13	-17.21	2081
10640701	404.4	198.99	198.99	-29.44	-29.44	
10640702	507.6	187.66	188.14	-48.09	-47.61	
10640703	598.1	177.13	177.22	-67.72	-67.63	
10640704	699.0	159.28	159.02	-98.86	-99.13	
10640706	800.1	161.87	161.65	-109.95	-110.17	
10640705	800.8	161.53	161.70	-110.25	-110.07	
10640707	903.8	180.73	180.99	-102.36	-102.09	
10640708	1002.2	203.42	203.25	-85.39	-85.56	
10640709	1103.4	222.45	222.54	-72.87	-72.78	
10640710	1201.6	234.87	234.70	-63.36	-63.53	
10640711	1294.8	244.52	244.65	-56.43	-56.30	
10640712	1409.9	254.96	254.96	-49.33	-49.33	
10640713	1595.3	263.09	263.13	-44.03	-43.99	
10640714	1801.3	260.51	262.03	-47.18	-45.65	
10640715	1998.5	263.53	263.40	-46.29	-46.42	
10640716	2199.2	260.61	259.61	-50.35	-51.35	
10640717	2397.2	258.43	258.78	-54.11	-53.76	
10640718	2597.0	263.14	263.27	-51.32	-51.19	
10640720	3003.5	267.77	267.85	-50.21	-50.12	
10640719	3003.9	267.94	267.81	-50.04	-50.17	

BATS 64—Bottle Data
January 11-18, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (μmole/kg)	Nitrite (μmole/kg)	Phosphate (μmole/kg)	Silicate (μmole/kg)
10640401	2.0			0.03	0.8
10640403	10.3			0.04	0.8
10640405	20.4			0.00	0.8
10640407	40.3			0.00	0.8
10640409	59.8				0.8
10640411	80.3				0.8
10640413	100.1			0.04	0.7
10640415	120.6	0.11	0.12	0.00	0.8
10640417	140.2	1.88	0.01	0.06	1.2
10640419	161.2	2.80	0.00	0.11	1.2
10640421	200.2	3.07		0.11	1.3
10640423	251.5	3.52		0.15	1.4
10640701	404.4	5.76		0.29	2.3
10640702	507.6	9.47		0.51	3.6
10640703	598.1	13.61		0.78	5.9
10640704	699.0	19.24		1.23	10.4
10640706	800.1			1.37	13.6
10640705	800.8	21.95		1.43	13.5
10640707	903.8	21.83		1.45	14.9
10640708	1002.2	20.25		1.36	14.3
10640709	1103.4	18.49		1.16	13.9
10640710	1201.6	17.30		1.17	13.7
10640711	1294.8	18.19		1.25	13.3
10640712	1409.9	17.40		1.16	13.2
10640713	1595.3	17.66		1.19	13.3
10640714	1801.3	17.46		1.20	15.0
10640715	1998.5	17.91		1.23	16.0
10640716	2199.2	18.36		1.28	19.2
10640717	2397.2				22.1
10640718	2597.0	18.46		1.30	22.5
10640720	3003.5				24.3
10640719	3003.9	18.15		1.29	24.5

BATS 64—Bottle Data
January 11-18, 1994
Particulates, Bacterial Abundance and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10640402	2.2	23.87	3.42	4.21	0.127	0.029
10640404	10.2	24.23	3.67	4.80	0.107	0.058
10640406	20.5	20.13	3.48	5.02	0.117	0.049
10640408	39.9	21.69	3.74	4.80	0.156	0.019
10640410	60.3	22.69	3.93	5.26	0.117	0.068
10640412	79.7	20.67	3.60	3.86	0.127	0.058
10640414	100.4	20.13	3.28	5.39	0.166	0.019
10640416	120.2	13.49	2.39	4.10	0.107	0.127
10640418	140.0	13.23	1.88	2.21	0.058	0.068
10640420	160.8	8.34	1.11	1.74	0.029	0.019
10640422	200.4	6.83	0.92	1.62	0.010	0.000
10640424	251.5	11.38	0.85	1.64	0.000	0.000
10640701	404.4	6.74	0.59	1.17		
10640702	507.6	7.05	0.72	1.02		
10640703	598.1	4.98	0.57			
10640704	699.0	7.12	0.85			
10640706	800.1	4.13	0.34			
10640705	800.8	6.42	0.79			
10640707	903.8	5.38	0.85			
10640708	1002.2	3.86	0.47			
10640709	1103.4			0.53		
10640712	1409.9			0.45		
10640720	3003.5			0.20		

BATS 64—Bottle Data
January 11-18, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10640402	2.2	6	18	5	32	31	13	156	4
10640404	10.2	6	19	5	29	31	15	143	6
10640406	20.5	6	17	5	31	31	15	141	5
10640408	39.9	6	18	5	31	34	16	146	7
10640410	60.3	8	19	5	32	31	17	146	7
10640412	79.7	7	20	5	32	40	17	159	7
10640414	100.4	9	20	5	32	36	19	166	10
10640416	120.2	9	34	5	30	24	90	174	21
10640418	140.0	6	21	5	32	5	51	98	12
10640420	160.8	2	7	5	18	0	13	25	0
10640422	200.4	0	0	5	5	0	0	7	0
10640424	251.5	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10640402	2.2	2	0	0	0	7	0	0
10640404	10.2	5	0	0	0	7	1	2
10640406	20.5	2	0	0	0	6	0	0
10640408	39.9	4	0	0	0	5	1	1
10640410	60.3	4	0	0	0	5	1	0
10640412	79.7	3	0	0	0	4	1	0
10640414	100.4	2	0	0	0	5	0	0
10640416	120.2	3	0	0	0	2	0	0
10640418	140.0	3	0	0	0	3	0	0
10640420	160.8	0	0	0	0	0	0	0
10640422	200.4	0	0	0	0	0	0	0
10640424	251.5	0	0	0	0	0	0	0

BATS 64: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	0.75	1.48	0.92	0.17	0.22	0.12	0.16	0.16
20	3.45	3.93	3.60	0.21	0.19	0.44	0.42	0.38
40	0.75	1.15	0.91	0.23	0.18	0.27	0.19	0.18
60	1.67	1.51	1.71	0.20	0.27	0.51	0.52	0.60
80	1.09	0.80	0.70	0.17	0.37	0.48	0.50	0.61
100	0.44	0.35	0.72	0.24	0.29	0.54	0.49	0.39
120	0.37	0.37	0.38	0.14	0.28	0.10	0.14	0.11
140	0.20	0.27	0.23	0.19	0.31	0.08	0.07	

BATS 64: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	316	58.21	9.89	1.65
150	317	70.69	14.37	2.64
150	318	70.22	13.88	2.57
200	319	37.42	8.49	1.44
200	320	54.05	10.08	1.58
200	321	53.59	12.06	2.27
300	322	34.65	4.28	0.72
300	323	32.80	7.50	1.79
300	324	32.34	6.32	1.16

BATS 65

Cruise Report

Cruise dates: February 15-19, 1994

Personnel: A. Doyle, R. Johnson, S. Becker, R. Little, R. Kelly, P. Countway, L. Banghart, R. Phyliky

R/V Weatherbird II

15 February 1994

1525 - Depart BBSR.

2154 - Deploy PITs. Lat: 31.754 N; Long: 64.180 W

2214- **CTD cast 1**, 500 m cast. (Buesseler)
Lat: 31.758 N; Long: 64.185 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 150, 150, 150, 150, 150, 150, 150, 150 m.

Samples taken:
total thorium (Buesseler) top 16 depths

2326 - CTD cast 1 on deck. Lat: 31.759 N; Long: 64.200 W

2343- Depart for Hydrostation S.

16 February1994

0242 - Arrive at Hydrostation S.

0248 - **HS 760 CTD cast,** 2600 m.
Lat: 32.171 N; Long: 64.500 W.

0550 - HS 760 CTD cast on deck.
Lat: 32.165 N; Long: 64.498 W.

1056 - **CTD cast 2**, 500 m cast.
Lat: 32.157 N; Long: 64.508 W
Nominal depths: 1, 1, 1, 1, 1,1, 1, 5, 10, 15, 20, 30, 40, 50, 60, 80, 80, 100, 100, 120, 140, 350, 400, 500 m.

Samples taken:

DMS (Dacey)	1, 5, 10, 15, 20, 30, 40, 60, 80, 100, 120 and 140 m.
pDMSP (Dacey)	1, 5, 10, 15, 20, 30, 40, 60, 80, 100, 120 and 140 m.
sDMSP (Dacey)	1, 5, 10, 15, 20, 30, 40, 60, 80, 100, 120 and 140 m.
chl *a* (BBOP)	1, 20, 40, 60, 80, 100, 120 and 140 m.

1202 - CTD cast 2 on deck. Lat: 32.148 N; Long: 64.507 W

1215 - BBOP cast. Lat: 32.147 N; Long: 64.508 W

1245 - Depart for BBSR.

1930 - Arrive at BBSR.

17 February 1994

0930 - Depart BBSR.

1425 - **CTD cast 3**, 4200 m cast.
Lat: 31.796 N; Long: 64.399 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4100 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000, 3400, and 4100 m

1756 - CTD cast 3 on deck. Lat: 31.801 N; Long: 64.454 W

1827 - BBOP cast. Lat: 31.796 N; Long: 64.438 W

2025 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.800 N; Long: 64.460 W

2037 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.803 N; Long: 64.465W

2140 - **CTD cast 4**, 500 m cast. (Buesseler)
Lat: 31.810 N; Long: 64.473 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,150, 150, 150, 150, 150,150,150,150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths

1756 - CTD cast 4 on deck. Lat: 31.819 N; Long: 64.490 W

2318 - BBOP cast. Lat: 31.815 N; Long: 64.490 W

18 February 1994

0200 - **GoFlo cast #1** (Lipschultz). Lat: 31.807 N; Long: 64.501 W

0402 - **GoFlo cast #2**, 140 m.
Lat: 31.810 N; Long: 64.518 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths
chl *a* (BBOP)	8 depths

0632 - Deploy primary production array.
Lat: 31.814 N; Long: 64.507 W
Problem with A-frame, ram broken.

0930 - A-frame fixed.

1018 - **CTD cast 5**, 500 m cast.
Lat: 31.803 N; Long: 64.567 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 250, 250, 250, 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
DOP/POP (Ammerman)	1, 20, 60, 100, 140 and 250 m

1115 - Begin Wakeham pumping. Lat: 31.473 N; Long: 64.575 W

1125 - CTD cast 5 on deck. Lat: 31.807 N; Long: 64.575 W

1138 - BBOP cast. Lat: 31.810 N; Long: 64.577 W
A-frame broken again. BBOP rigged up to crane. All is fine.

1210 - Wakeham pumping stopped due to problem with the hose.

1220 - Wakeham pumping resumed.

1233 - **CTD cast 6**, 500 m cast.
Lat: 31.815 N; Long: 64.593 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths
DIC	12 depths; replicates at 20, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	12 depths
picoplankton (Olson)	12 depths

1332 - CTD cast 6 on deck. Lat: 31.820 N; Long: 64.600 W

1350 - BBOP cast. Lat: 31.821 N; Long: 64.601 W

1448 - End Wakeham pumping. Lat: 31.824 N; Long: 64.606 W

1524 - BBOP cast. Lat: 31.808 N; Long: 64.613 W

1625 - BBOP cast. Lat: 31.806 N; Long: 64.623 W

1702 - **CTD cast 7**, 500 m cast. Calibration cast
Lat: 31.811 N; Long: 64.635 W
Nominal depths: No bottles fired.

1726 - CTD cast 7 on deck. Lat: 31.817 N; Long: 64.638 W

1729 - **CTD cast 8**, 500 m cast.
Lat: 31.818 N; Long: 64.639 W
Nominal depths: replicates at 1, replicates at 10, 10, 60, 150, 200, 200, 200, 200, 300 m.

Samples taken:

RNA/DNA (Giovannoni)	1 and 200 m.
bacteria (Giovannoni)	1, 60, 150, 200, and 300 m.

particulate I (Jickells) 1 m.

1805 - CTD cast 8 on deck. Lat: 31.822 N; Long: 64.646 W

1819 - BBOP cast. Lat: 31.822 N; Long: 64.648 W

1910 - Recover primary production array.
Lat: 31.806 N; Long: 64.646 W

2050 - **GoFlo cast #3** (Lipschultz). Lat: 31.821 N; Long: 64.671 W

2145 - **CTD cast 9**, 500 m cast.
Lat: 31.829 N; Long: 64.677 W
Nominal depths: 1, 10, 10, 10, 10, 10, 10, 10, 10, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 m.

Samples taken:
total thorium top 16 depths

2256 - CTD cast 9 on deck. Lat: 31.836 N; Long: 64.677 W

2312 - BBOP cast. Lat: 31.840 N; Long: 64.680 W

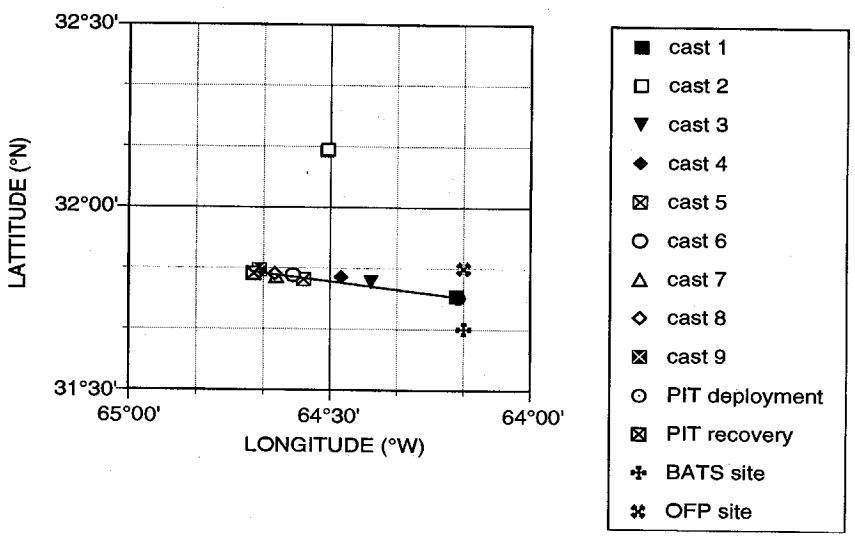
2355 - Recover PITs. Lat: 31.819 N; Long: 64.691 W

19 February 1994

0045 - Depart for BBSR.

0535 - Arrive BBSR.

Cast positions: BATS 65

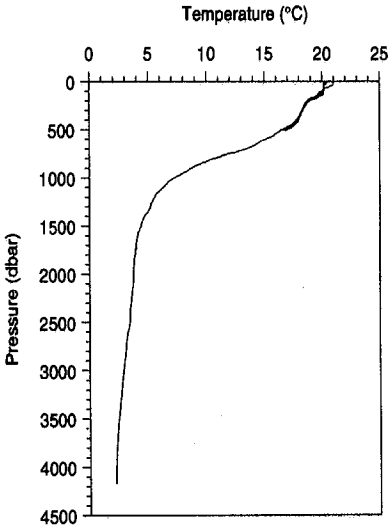


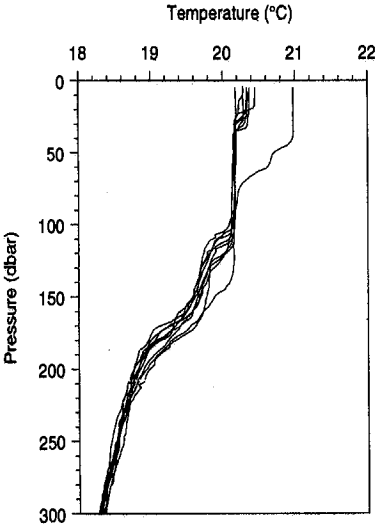
BATS 65, CTD Cast 3
February 17, 1994
Start cast: time: 1425 lat: 31.796 N long: 64.399 W
End cast: time: 1756 lat: 31.801 N long: 64.454 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	$Sigma_\theta$ (kg/m^3)	CTD O_2 (µmole/kg)	O_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
6.0	6.0	20.288	20.287	36.608	25.913	225.01	9.00		
10.0	10.1	20.281	20.279	36.606	25.914	224.52	8.48		
20.0	20.1	20.225	20.221	36.593	25.920	224.56	8.28		
30.0	30.2	20.163	20.157	36.581	25.927	224.72	8.18		
40.0	40.3	20.164	20.156	36.585	25.931	224.51	7.98		
50.0	50.4	20.159	20.150	36.586	25.933	224.67	8.13		
60.0	60.4	20.157	20.146	36.586	25.935	224.52	7.97		
70.0	70.5	20.134	20.121	36.581	25.938	224.39	7.75		
80.0	80.6	20.128	20.113	36.580	25.939	224.01	7.34		
90.0	90.6	20.123	20.106	36.579	25.940	223.86	7.17		
100.0	100.7	20.122	20.103	36.579	25.940	223.87	7.17		
110.0	110.8	19.924	19.903	36.562	25.981	221.57	4.08		
120.0	120.9	19.822	19.800	36.561	26.007	219.97	2.08		
130.0	131.0	19.735	19.711	36.557	26.028	220.12	1.89		
140.0	141.0	19.665	19.639	36.553	26.044	220.34	1.82		
150.0	151.1	19.574	19.547	36.578	26.087	215.09	-3.75		
160.0	161.2	19.463	19.434	36.596	26.130	209.03	-10.21		
170.0	171.3	19.227	19.196	36.611	26.203	202.93	-17.23		
180.0	181.3	19.047	19.015	36.612	26.251	201.29	-19.59		
190.0	191.4	18.879	18.844	36.605	26.290	202.04	-19.53		
200.0	201.5	18.826	18.789	36.603	26.302	202.61	-19.18		
210.0	211.6	18.747	18.709	36.599	26.320	203.92	-18.19		
220.0	221.7	18.662	18.623	36.595	26.339	206.16	-16.31		
230.0	231.7	18.602	18.560	36.592	26.352	206.72	-15.99		
240.0	241.8	18.558	18.515	36.590	26.362	207.28	-15.62		
250.0	251.9	18.529	18.484	36.588	26.368	207.40	-15.62		
275.0	277.1	18.451	18.402	36.579	26.383	207.14	-16.22		
300.0	302.3	18.329	18.276	36.564	26.402	206.77	-17.11		
325.0	327.5	18.227	18.170	36.551	26.419	207.29	-17.04		
350.0	352.7	18.147	18.085	36.540	26.432	207.56	-17.11		
375.0	378.0	18.052	17.986	36.527	26.446	207.60	-17.50		
400.0	403.2	17.896	17.826	36.502	26.468	204.57	-21.21		
425.0	428.4	17.641	17.567	36.461	26.499	202.46	-24.48		
450.0	453.6	17.388	17.311	36.412	26.525	197.42	-30.67		
475.0	478.9	17.098	17.018	36.358	26.554	192.26	-37.17		
500.0	504.1	16.530	16.447	36.255	26.610	185.02	-47.08		
550.0	554.6	15.881	15.792	36.152	26.683	183.27	-51.92		
600.0	605.1	15.124	15.030	36.025	26.757	175.04	-63.87		
650.0	655.6	14.286	14.188	35.890	26.836	168.89	-74.25		
700.0	706.1	13.366	13.264	35.752	26.923	166.50	-81.44		
750.0	756.6	11.745	11.645	35.526	27.066	158.58	-98.21		
800.0	807.2	10.543	10.443	35.376	27.169	156.18	-107.54		
850.0	857.7	9.478	9.378	35.258	27.258	154.59	-115.52		
900.0	908.3	8.560	8.460	35.191	27.354	159.73	-116.04		
950.0	958.9	7.881	7.780	35.158	27.431	168.89	-111.18		
1000.0	1009.4	7.129	7.028	35.132	27.520	182.15	-102.81		
1050.0	1060.0	6.636	6.534	35.130	27.586	193.85	-94.36		
1100.0	1110.7	6.211	6.107	35.119	27.633	204.81	-86.29		
1150.0	1161.3	5.779	5.673	35.104	27.677	215.91	-78.19		
1200.0	1211.9	5.505	5.396	35.097	27.705	222.83	-73.19		
1300.0	1313.2	5.176	5.061	35.085	27.736	232.42	-65.94		

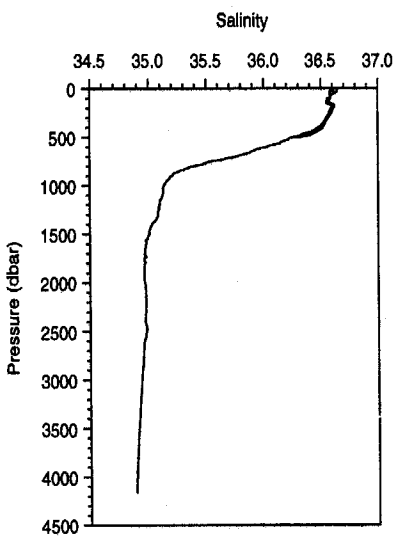
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.637	4.517	35.027	27.752	244.71	-57.67		
1500.0	1516.0	4.346	4.220	35.004	27.766	251.07	-53.50		
1600.0	1617.4	4.064	3.932	34.976	27.775	256.94	-49.79		
1700.0	1718.9	3.963	3.823	34.972	27.783	259.60	-47.90		
1800.0	1820.5	3.847	3.699	34.969	27.792	261.31	-47.07		
1900.0	1922.1	3.774	3.618	34.967	27.799	262.40	-46.53		
2000.0	2023.7	3.738	3.572	34.974	27.809	262.45	-46.74		
2100.0	2125.4	3.693	3.518	34.979	27.818	262.00	-47.52		
2200.0	2227.2	3.588	3.405	34.978	27.829	261.93	-48.39		
2300.0	2328.9	3.493	3.301	34.975	27.837	261.94	-49.12		
2400.0	2430.8	3.450	3.249	34.977	27.844	261.64	-49.73		
2500.0	2532.7	3.376	3.165	34.978	27.852	260.18	-51.77		
2600.0	2634.6	3.210	2.993	34.961	27.855	262.18	-51.08		
2700.0	2736.6	3.117	2.891	34.955	27.859	262.94	-51.07		
2800.0	2838.6	3.049	2.814	34.951	27.863	262.98	-51.57		
2900.0	2940.7	2.937	2.693	34.943	27.867	264.03	-51.42		
3000.0	3042.8	2.852	2.600	34.938	27.872	264.69	-51.44		
3100.0	3144.9	2.758	2.497	34.932	27.876	265.41	-51.48		
3200.0	3247.2	2.687	2.418	34.928	27.879	265.40	-52.05		
3300.0	3349.4	2.595	2.317	34.922	27.883	266.00	-52.21		
3400.0	3451.7	2.496	2.209	34.916	27.887	265.97	-53.04		
3500.0	3554.1	2.426	2.130	34.911	27.890	265.31	-54.28		
3600.0	3656.5	2.364	2.058	34.907	27.892	265.75	-54.35		
3700.0	3758.9	2.313	1.997	34.902	27.894	265.49	-55.04		
3800.0	3861.4	2.268	1.941	34.898	27.895	264.54	-56.37		
3900.0	3964.0	2.248	1.911	34.895	27.895	263.77	-57.30		
4000.0	4066.5	2.227	1.879	34.892	27.895	262.87	-58.38		
4100.0	4169.2	2.216	1.857	34.890	27.895	262.10	-59.24		

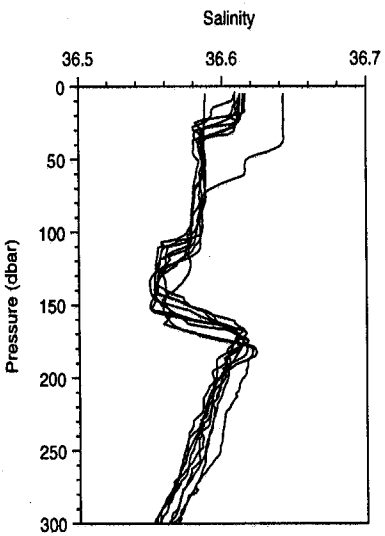
BATS 65—CTD Temperature Profiles



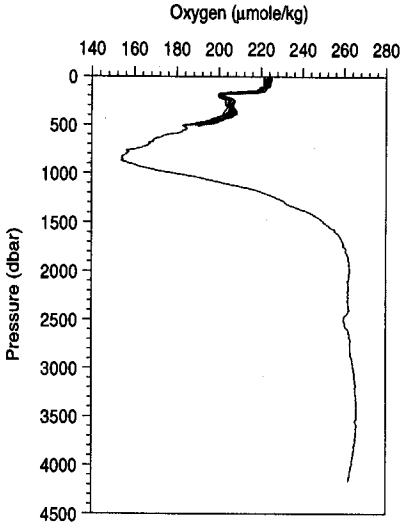


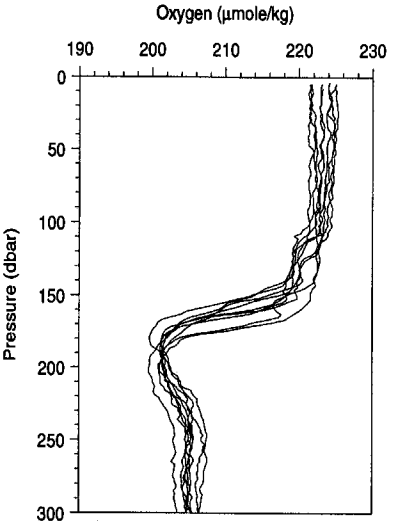
BATS 65—CTD Salinity Profiles



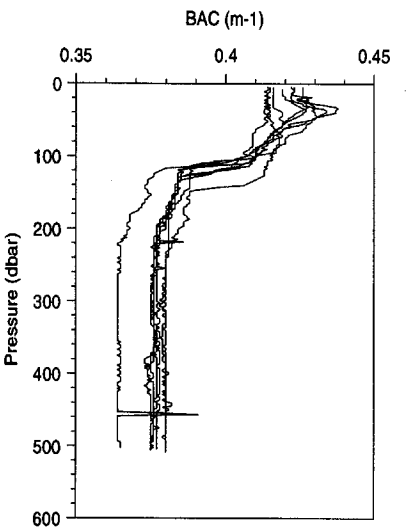


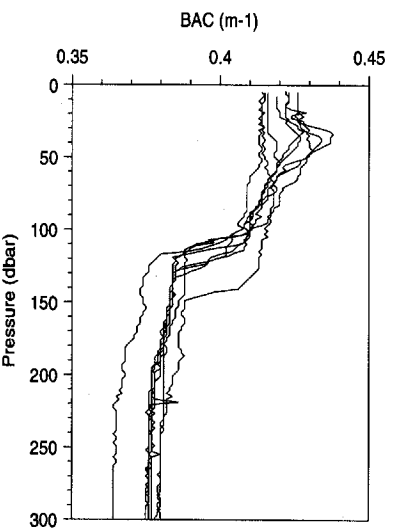
BATS 65—CTD Oxygen Profiles



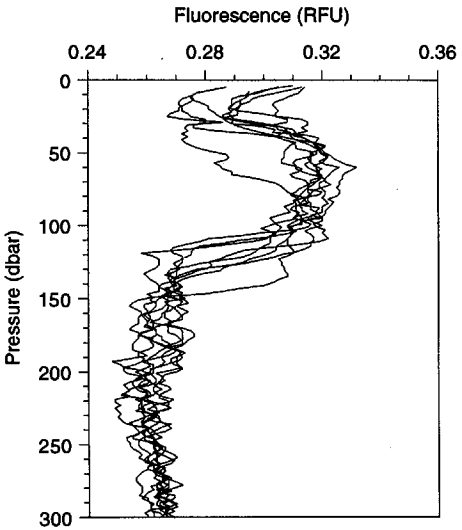


BATS 65—CTD BAC Profiles

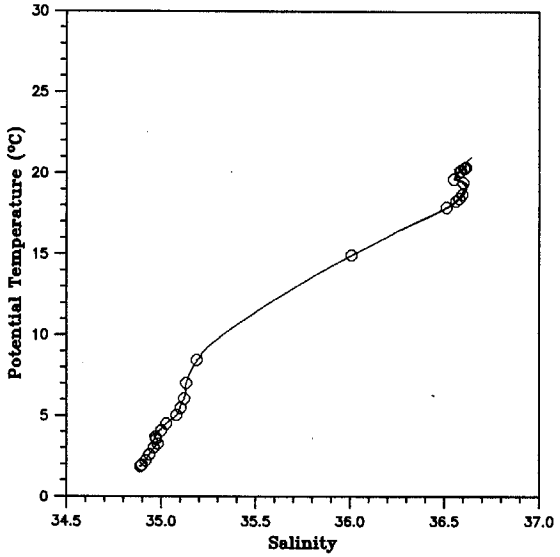




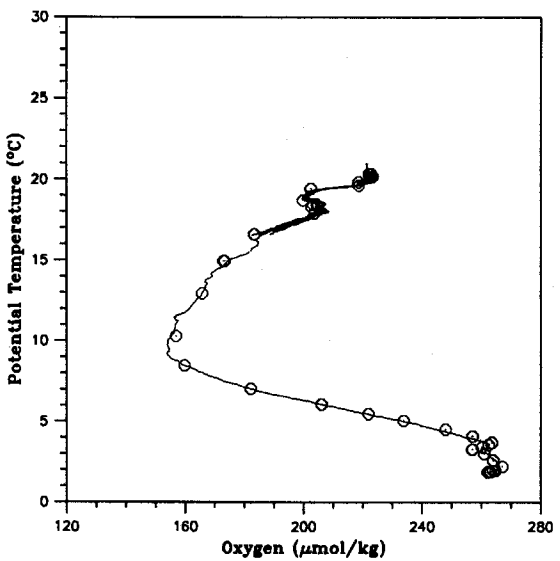
BATS 65—CTD Fluorescence Profiles



BATS 65—T-S Diagram



BATS 65—T-O Diagram



BATS 65—Bottle Data
February 15-19, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	Sigma$_\theta$ (kg/m^3)
10650602	1.7	1.7	20.358	36.613	20.358	36.614	25.899
10650601	2.3	2.3	20.359	36.612	20.358		25.898
10650604	10.1	10.2	20.359	36.613	20.357		25.899
10650603	10.2	10.2	20.359	36.613	20.357	36.613	25.899
10650606	20.6	20.8	20.319	36.606	20.315		25.904
10650605	21.0	21.2	20.314	36.605	20.310	36.605	25.905
10650608	40.2	40.5	20.174	36.589	20.166		25.931
10650607	40.8	41.1	20.174	36.589	20.166	36.588	25.930
10650610	59.7	60.1	20.171	36.589	20.159		25.933
10650609	59.7	60.2	20.170	36.589	20.159	36.589	25.933
10650611	79.9	80.5	20.166	36.589	20.150	36.587	25.934
10650612	80.3	80.8	20.166	36.588	20.151		25.935
10650613	99.0	99.7	20.132	36.582	20.114	36.581	25.939
10650614	99.5	100.2	20.128	36.582	20.109		25.941
10650615	119.1	120.0	19.846	36.557	19.824		25.998
10650616	119.6	120.5	19.845	36.557	19.823		25.999
10650618	140.3	141.3	19.656	36.550	19.630		26.044
10650617	140.6	141.7	19.658	36.550	19.631	36.550	26.043
10650620	158.8	160.0	19.442	36.601	19.412		26.139
10650619	159.1	160.3	19.449	36.599	19.420	36.600	26.137
10650621	199.9	201.4	18.729	36.594	18.693	36.595	26.321
10650622	200.4	201.9	18.728	36.594	18.692		26.320
10650624	250.0	251.9	18.484	36.579	18.440		26.373
10650623	250.6	252.5	18.483	36.579	18.438	36.579	26.373
10650301	301.3	303.6	18.328	36.562	18.275	36.562	26.401
10650302	399.1	402.2	17.957	36.511	17.887	36.511	26.459
10650303	505.0	509.1	16.682	36.280	16.598		26.594
10650304	602.5	607.6	15.043	36.009	14.949	36.008	26.762
10650305	706.2	712.3	13.045	35.703	12.944		26.950
10650306	801.8	809.0	10.380	35.353	10.280		27.179
10650307	897.9	906.2	8.558	35.188	8.459	35.187	27.351
10650308	997.2	1006.6	7.120	35.131	7.020	35.132	27.520
10650309	1103.0	1113.7	6.158	35.121	6.053	35.121	27.642
10650310	1198.2	1210.1	5.575	35.101	5.466	35.102	27.700
10650311	1299.8	1313.0	5.153	35.081	5.038	35.080	27.735
10650312	1403.2	1417.9	4.613	35.026	4.494	35.026	27.754
10650313	1595.6	1612.9	4.210	34.998	4.077	34.999	27.778
10650314	1809.6	1830.3	3.834	34.970	3.686	34.970	27.794
10650315	2001.0	2024.7	3.719	34.973	3.553	34.973	27.811
10650316	2199.0	2226.1	3.594	34.979	3.411		27.829
10650317	2400.8	2431.6	3.460	34.982	3.258	34.982	27.846
10650318	2591.0	2625.4	3.218	34.961	3.001	34.960	27.854
10650319	3004.6	3047.5	2.837	34.937	2.585	34.938	27.873
10650320	3006.5	3049.4	2.837	34.937	2.585	34.937	27.872
10650321	3406.9	3458.8	2.485	34.915	2.197	34.917	27.889
10650322	3799.6	3861.0	2.264	34.898	1.938	34.898	27.895
10650323	3998.8	4065.3	2.226	34.892	1.878	34.892	27.895
10650324	4097.9	4167.0	2.216	34.890	1.856	34.889	27.895

BATS 65—Bottle Data
February 15-19, 1994
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10650601	2.3	222.01	222.88	6.28	7.15	2050
10650603	10.2	222.02	222.24	6.30	6.51	2049
10650605	21.0	222.50	222.37	6.59	6.46	2050
10650607	40.8	223.45	223.45	6.97	6.97	2053
10650609	59.7	222.75	222.93	6.26	6.43	2051
10650611	79.9	222.75	222.53	6.24	6.02	2051
10650613	99.0	222.31	222.14	5.66	5.49	2053
10650615	119.1	218.66	218.61	0.85	0.81	2058
10650617	140.6	218.77	218.72	0.21	0.17	2062
10650619	159.1	202.65	202.39	-16.65	-16.91	2080
10650621	199.9	199.79	199.92	-22.41	-22.27	2083
10650623	250.6	203.26	204.44	-19.96	-18.79	2087
10650301	301.3	202.77		-21.12		
10650302	399.1	203.68	203.54	-21.84	-21.97	
10650303	505.0	183.17	183.52	-48.22	-47.87	
10650304	602.5	173.45	172.88	-65.87	-66.44	
10650305	706.2	165.74	165.69	-83.92	-83.96	
10650306	801.8	156.85	156.89	-107.84	-107.80	
10650307	897.9	159.79	159.70	-116.01	-116.09	
10650308	997.2	182.21	182.08	-102.81	-102.94	
10650309	1103.0	206.19	205.97	-85.27	-85.49	
10650310	1198.2	221.97	221.89	-73.54	-73.63	
10650311	1299.8	233.80	233.75	-64.74	-64.78	
10650312	1403.2	247.97	247.88	-54.59	-54.68	
10650313	1595.6	257.19	256.93	-48.40	-48.66	
10650314	1809.6	263.72	263.50	-44.75	-44.97	
10650315	2001.0	262.53	262.53	-46.80	-46.80	
10650316	2199.0	260.31	260.36	-49.95	-49.91	
10650317	2400.8	257.17	256.87	-54.11	-54.42	
10650318	2591.0	261.00	260.95	-52.21	-52.26	
10650319	3004.6	264.12	263.91	-52.13	-52.34	
10650320	3006.5	264.13	264.17	-52.12	-52.08	
10650321	3406.9	267.20	267.12	-51.91	-51.99	
10650322	3799.6	264.81	264.03	-56.12	-56.90	
10650323	3998.8	263.25	262.81	-58.01	-58.44	
10650324	4097.9	262.19	262.15	-59.15	-59.20	

BATS 65—Bottle Data
February 15-19, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10650602	1.7	0.00	0.00	0.00	0.9
10650603	10.2	0.00	0.00	0.00	0.9
10650605	21.0	0.00	0.00	0.00	0.9
10650607	40.8	0.00	0.00	0.00	0.9
10650609	59.7	0.00	0.00	0.00	0.8
10650611	79.9	0.00	0.03	0.00	0.9
10650613	99.0	0.06	0.06	0.00	0.9
10650615	119.1	0.58	0.18	0.00	0.9
10650617	140.6	0.85	0.09	0.00	1.0
10650619	159.1	1.63	0.03	0.06	1.1
10650621	199.9	2.94	0.00	0.17	1.4
10650623	250.6	3.14	0.00	0.18	1.4
10650301	301.3	3.47	0.00	0.18	1.5
10650302	399.1	4.09	0.00	0.20	1.8
10650303	505.0	8.24	0.00	0.47	3.2
10650304	602.5	11.70	0.00		5.1
10650305	706.2	15.58	0.00	0.94	7.6
10650306	801.8		0.00	1.31	12.3
10650307	897.9	22.83	0.00	1.47	14.9
10650308	997.2	22.08	0.00	1.43	15.4
10650309	1103.0	20.72	0.00	1.35	14.8
10650310	1198.2	19.78	0.00	1.28	14.3
10650311	1299.8	19.21	0.00	1.25	14.1
10650312	1403.2	18.50	0.00	1.21	13.5
10650313	1595.6	17.91	0.00	1.19	13.6
10650314	1809.6	17.81	0.00	1.21	14.3
10650315	2001.0	17.95	0.00	1.20	15.5
10650316	2199.0	18.20	0.00	1.21	17.6
10650317	2400.8	18.64	0.00	1.29	20.7
10650318	2591.0	18.36	0.00	1.26	21.1
10650319	3004.6	18.37	0.00	1.24	23.4
10650320	3006.5	18.33	0.00	1.26	23.3
10650321	3406.9	18.23	0.00	1.24	26.3
10650322	3799.6	18.97	0.00	1.29	32.3
10650323	3998.8	19.41	0.00	1.32	35.1
10650324	4097.9	19.55	0.00	1.34	36.2

BATS 65—Bottle Data
February 15-19, 1994
Particulates, Bacterial Abundance and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10650602	1.7	22.62	4.24	5.49	0.136	0.019
10650604	10.1	34.34	5.63	5.13	0.185	0.000
10650606	20.6	33.95	7.23	5.30	0.166	0.019
10650608	40.2	30.68	6.12	5.02	0.263	0.039
10650610	59.7	38.36	7.78	5.83	0.282	0.010
10650612	80.3	25.07	5.77	5.99	0.214	0.058
10650614	99.5	26.68	5.56	5.98	0.214	0.039
10650616	119.6	10.74	2.64	4.04	0.049	0.049
10650618	140.3	12.13	2.92	4.49	0.039	0.039
10650620	158.8	15.30	2.71	2.50	0.029	0.019
10650622	200.4	9.28	1.88	1.74	0.010	0.000
10650624	250.0	12.76	2.29	1.61	0.000	0.000
10650301	301.3	5.72	1.60	1.13		
10650302	399.1	8.43	1.73	1.44		
10650303	505.0	7.64	2.00			
10650304	602.5	11.93	1.39			
10650305	706.2	8.90	1.89			
10650306	801.8	5.62	1.32			
10650307	897.9	3.95	1.17			
10650308	997.2	10.18	2.22			
10650309	1103.0			0.55		
10650312	1403.2			0.39		
10650320	3006.5			0.25		
10650323	3998.8			0.32		

BATS 65—Bottle Data
February 15-19, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10650602	1.7	7	14	5	32	35	10	128	5
10650604	10.1	6	16	5	35	38	13	139	5
10650606	20.6	6	18	5	41	48	15	165	3
10650608	40.2	14	29	5	74	42	19	239	13
10650610	59.7	17	36	5	81	36	22	249	10
10650612	80.3	14	29	5	71	31	20	214	12
10650614	99.5	12	30	5	67	21	17	203	11
10650616	119.6	6	16	5	24	2	14	68	0
10650618	140.3	3	14	5	12	3	0	42	0
10650620	158.8	6	7	5	8	0	0	19	0
10650622	200.4	0	0	5	0	0	0	0	0
10650624	250.0	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10650602	1.7	3	0	0	0	7	0	0
10650604	10.1	3	0	0	0	7	0	0
10650606	20.6	2	0	0	0	7	0	3
10650608	40.2	6	0	0	0	7	2	0
10650610	59.7	7	0	0	0	5	2	0
10650612	80.3	8	0	0	0	5	2	0
10650614	99.5	7	0	0	2	4	1	0
10650616	119.6	2	0	0	0	1	2	0
10650618	140.3	3	0	0	0	0	0	0
10650620	158.8	0	0	0	0	0	0	0
10650622	200.4	0	0	0	0	0	0	0
10650624	250.0	0	0	0	0	0	0	0

BATS 65: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	5.81	5.82	5.94	0.33	0.27	0.55	0.57	0.62
20	5.05	5.59	6.83	0.31	0.42	0.50	0.56	0.50
40	4.83	5.92	4.36	0.33	0.27	0.97	1.04	0.88
60	3.52	3.79	3.34	0.28	0.37	0.76	0.64	0.76
80	1.36	1.76	0.92	0.23	0.31	0.32	0.34	0.39
100	0.57	0.66	0.57	0.21	0.22	0.16	0.31	
120	0.30	0.28	0.29	0.19	0.26		0.27	0.17
140	0.20	0.20	0.21	0.15	0.33	0.23	0.07	0.08

BATS 65: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	325	146.64	25.42	5.31
150	326	135.17	23.41	4.21
150	327	133.53	22.57	4.47
200	328	112.23	15.22	2.25
200	329	99.94	16.99	3.15
200	330	100.76	18.15	3.59
300	331	49.15	9.32	1.39
300	332	92.57	14.15	2.10
300	333	53.25	8.56	1.34

BATS 66

Cruise Report

Cruise dates: March 14-21, 1994

Personnel: A. Close, F. Howse, A. Doyle, L. Caporelli, S. Becker, L. Banghart, R. Phyliky, E. Nixon.

R/V Weatherbird II

14 March 1994

0708 - Depart BBSR.

1330 - Deploy PITs. Lat: 31.747 N; Long: 64.166 W

1420 - **CTD cast 1**, 500 m cast.
Lat: 31.750 N; Long: 64.159 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 150, 150, 150, 150, 150, 150, 150, 150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 10, 20, 40, 60, 80, 100, 120 and140 m

1545 - CTD cast 1 on deck. Lat: 31.752 N; Long: 64.159 W

1609 - BBOP cast. Lat: 31.738 N; Long: 64.175 W

1707 - **CTD cast 2**, 4200 m cast.
Lat: 31.743 N; Long: 64.175 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths - internal reps x6 at 500 and 800 m
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000, 3400, and 3800 m

2135 - CTD cast 2 on deck. Lat: 31.781 N; Long: 64.158 W

15 March 1994

0430 - **GoFlo cast #1**, 140 m.
Lat: 31.708 N; Long: 64.276 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths
chl *a* (BBOP)	8 depths

Winds 25-30 knots, seas increasing.

0636 - Deploy primary production array.
Lat: 31.694 N; Long: 64.218 W
Winds 30-35 knots, too rough for CTD casting

1857 - Recover primary production array.
Lat: 31.627 N; Long: 64.257 W

2040 - **GoFlo cast #2** (Lipshultz)
Lat: 31.617 N; Long: 64.260 W

2240 - Depart for BBSR.

16 March 1994

0515 - Arrive at BBSR

17 March 1994

1515 - Depart BBSR. Personnel: A. Close, F. Howse, R. Little, L. Madin.

1615 - Zooplankton tow (Madin), 0-100 m (200 µm net). Lat: 32.348 N; Long: 64.594 W
Wire broke, lost net

1635 - Depart for BBSR

1755 - Arrive at BBSR

18-19 March 1994

Gale force winds, high seas.

20 March 1994

1110 - Depart BBSR. Personnel: A. Close, F. Howse, L. Caporelli

1834 - **CTD cast 3**, 500 m cast.
Lat: 31.462 N; Long: 64.310 W
Nominal depths: 1, 1, 1, 10, 20, 30, 40, 50, 60, 60, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 200, 200, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
dissolved I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m.
particulate I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, and 200 m.

1956 - CTD cast 3 on deck. Lat: 31.453 N; Long: 64.307 W

2116 - **CTD Cast 4**, 500 m cast.
Lat: 31.487 N; Long: 64.236 W
Nominal depths: 1, 10, 20, 40, 40, 60, 80, 100, 120,140, replicates at 160 m.

Samples taken:

acantharia (Michaels)	top 10 depths

2220 - CTD cast 4 on deck. Lat: 31.483 N; Long: 64.217 W

21 March 1994

0437 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.462 N; Long: 64.267W

0452 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.456 N; Long: 64.256W

0611 - **CTD cast 5**, 400 m. Lat: 31.418 N; Long: 64.332 W
Calibration cast. No bottles fired.

0637 - CTD cast 5 on deck. Lat: 31.410 N; Long: 64.331 W

0640 - **CTD cast 6**, 500 m cast.
Lat: 31.409 N; Long: 64.330 W
Nominal depths: 1, 10, 10, 10, 10, 10, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 200, 250, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

0800 - CTD Cast 6 on deck. Lat: 31.393 N; Long: 64.341 W

0858 - Recover PITs. Lat: 31.403 N; Long: 64.338 W

0957 - **CTD cast 7**, 500 m cast.
Lat: 31.412 N; Long: 64.349 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths
DIC	12 depths; replicates at 1, 40,20 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths
chl *a* (BBOP)	12 depths

0922 - Begin Wakeham pumping.

1100 - CTD cast 7 on deck. Lat: 31.395 N; Long: 64.345 W

1104 - End Wakeham pumping.

1115 - Depart for Hydrostation S.

1635 - Arrive at Hydrostation S.

1650 - **HS 762 CTD cast,** 2600 m.
Lat: 32.167 N; Long: 64.501 W

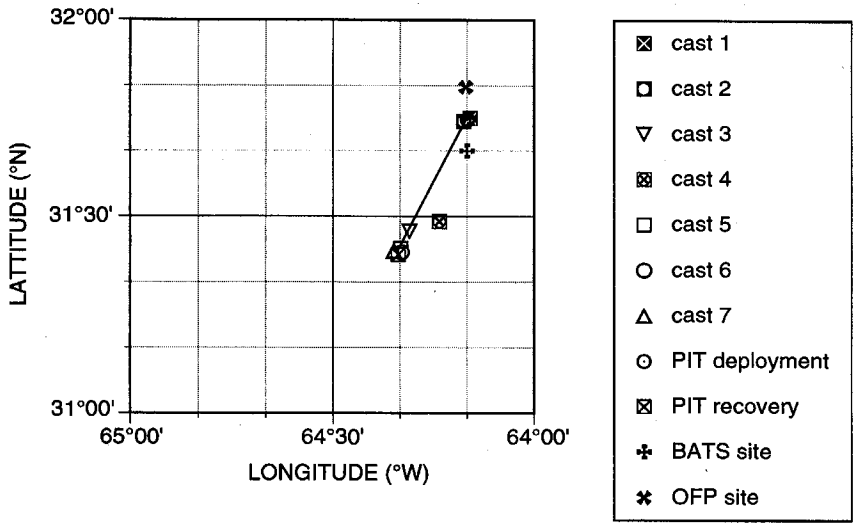
1939 - HS 762 CTD cast on deck. Lat: 32.182 N; Long: 64.498 W

2003 - **GoFlo cast #2** (Lipshultz).

2005 - Depart for BBSR.

2230 - Arrive at BBSR.

Cast positions: BATS 66

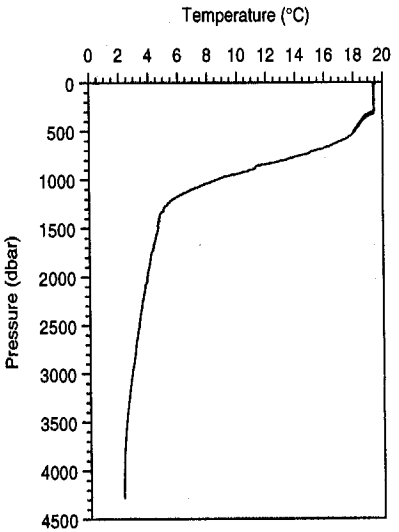


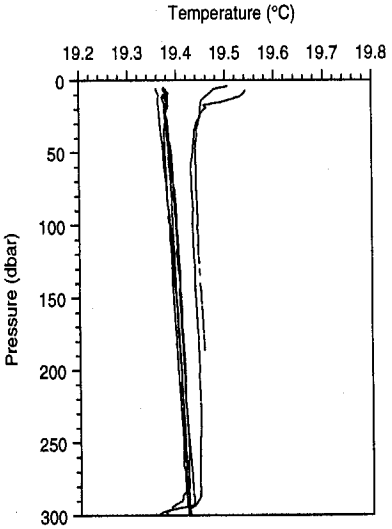
BATS 66, CTD Cast 2
March 14, 1994
Start cast: time: 1707 lat: 31.743 N long: 64.175 W
End cast: time: 2135 lat: 31.781 N long: 64.158 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
7.0	7.0	19.543	19.541	36.568	26.081	227.13	8.15	0.452	
10.0	10.1	19.535	19.533	36.567	26.082	226.98	7.97	0.453	
20.0	20.1	19.457	19.454	36.564	26.100	227.00	7.68	0.458	
30.0	30.2	19.441	19.436	36.564	26.105	226.80	7.41	0.459	
40.0	40.3	19.436	19.429	36.564	26.107	226.37	6.97	0.453	
50.0	50.4	19.434	19.425	36.564	26.108	226.48	7.06	0.448	
60.0	60.4	19.430	19.419	36.564	26.110	226.12	6.69	0.436	
70.0	70.5	19.431	19.418	36.564	26.110	225.90	6.48	0.432	
80.0	80.6	19.433	19.418	36.564	26.110	225.63	6.21	0.430	
90.0	90.6	19.434	19.417	36.565	26.111	225.84	6.43	0.426	
100.0	100.7	19.433	19.415	36.565	26.111	225.88	6.47	0.425	
110.0	110.8	19.434	19.414	36.565	26.111	225.54	6.12	0.424	
120.0	120.9	19.436	19.414	36.565	26.112	225.59	6.18	0.423	
130.0	131.0	19.437	19.413	36.565	26.112	225.51	6.11	0.424	
140.0	141.0	19.438	19.412	36.565	26.112	225.29	5.89	0.422	
150.0	151.1	19.439	19.412	36.565	26.112	225.35	5.96	0.423	
160.0	161.2	19.441	19.411	36.565	26.112	225.38	5.99	0.423	
170.0	171.3	19.443	19.411	36.565	26.112	225.68	6.30	0.422	
180.0	181.3	19.444	19.410	36.565	26.113	225.57	6.20	0.423	
190.0	191.4	19.445	19.410	36.565	26.113	225.44	6.08	0.423	
200.0	201.5	19.446	19.409	36.565	26.113	225.56	6.19	0.423	
210.0	211.6	19.446	19.407	36.565	26.114	225.23	5.87	0.425	
220.0	221.7	19.447	19.406	36.565	26.114	225.41	6.06	0.425	
230.0	231.7	19.448	19.405	36.565	26.114	225.22	5.87	0.424	
240.0	241.8	19.448	19.404	36.565	26.115	225.47	6.11	0.422	
250.0	251.9	19.447	19.400	36.565	26.115	225.23	5.86	0.421	
275.0	277.1	19.445	19.395	36.565	26.117	224.81	5.44	0.421	
300.0	302.3	19.420	19.365	36.563	26.123	222.76	3.29	0.409	
325.0	327.5	19.247	19.188	36.572	26.176	218.17	-1.97	0.392	
350.0	352.7	18.905	18.842	36.599	26.286	206.41	-15.06	0.388	
375.0	378.0	18.652	18.585	36.592	26.346	208.52	-13.99	0.387	
400.0	403.2	18.559	18.487	36.587	26.367	208.91	-13.99	0.386	
425.0	428.4	18.450	18.374	36.579	26.390	208.08	-15.28	0.385	
450.0	453.6	18.352	18.271	36.566	26.405	207.27	-16.52	0.386	
475.0	478.9	18.184	18.100	36.542	26.429	207.54	-16.98	0.385	
500.0	504.1	18.097	18.008	36.530	26.443	208.16	-16.74	0.385	
550.0	554.6	17.759	17.663	36.476	26.487	202.37	-24.03	0.384	
600.0	605.1	17.119	17.017	36.355	26.552	190.69	-38.66	0.384	
650.0	655.6	16.398	16.290	36.229	26.627	175.19	-57.54	0.384	
700.0	706.1	15.275	15.165	36.043	26.740	173.01	-65.16	0.384	
750.0	756.6	14.308	14.194	35.884	26.830	167.50	-75.55	0.384	
800.0	807.2	13.047	12.933	35.691	26.942	159.03	-90.63	0.383	
850.0	857.7	11.498	11.385	35.485	27.083	156.11	-102.10	0.382	
900.0	908.3	10.817	10.702	35.404	27.144	155.44	-106.68	0.382	
950.0	958.9	9.529	9.416	35.254	27.249	153.09	-116.73	0.382	
1000.0	1009.4	8.498	8.387	35.159	27.340	155.51	-120.72	0.384	
1050.0	1060.0	7.621	7.511	35.120	27.441	171.91	-109.90	0.384	
1100.0	1110.7	6.787	6.678	35.100	27.542	190.35	-96.93	0.382	
1150.0	1161.3	6.107	5.998	35.077	27.614	206.95	-84.96	0.381	
1200.0	1211.9	5.544	5.435	35.048	27.662	219.87	-76.00	0.382	
1300.0	1313.2	4.988	4.875	35.024	27.709	234.42	-65.43	0.380	

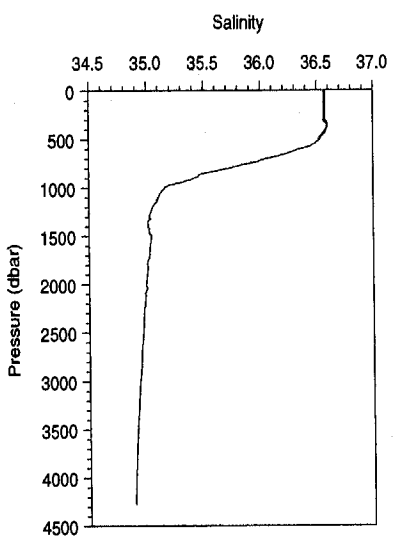
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.691	4.571	35.020	27.740	243.77	-58.24	0.380	
1500.0	1516.0	4.628	4.499	35.042	27.766	246.76	-55.65	0.375	
1600.0	1617.4	4.447	4.311	35.032	27.778	250.06	-53.69	0.373	
1700.0	1718.9	4.278	4.134	35.023	27.791	252.45	-52.57	0.372	
1800.0	1820.5	4.117	3.965	35.010	27.798	254.54	-51.71	0.371	
1900.0	1922.1	3.983	3.823	35.003	27.807	255.79	-51.48	0.371	
2000.0	2023.7	3.870	3.702	34.998	27.816	256.71	-51.41	0.370	
2100.0	2125.4	3.728	3.553	34.990	27.824	257.63	-51.59	0.369	
2200.0	2227.2	3.608	3.424	34.984	27.832	258.15	-52.01	0.369	
2300.0	2328.9	3.491	3.299	34.976	27.838	259.11	-51.95	0.368	
2400.0	2430.8	3.382	3.182	34.971	27.845	259.61	-52.30	0.368	
2500.0	2532.7	3.290	3.081	34.966	27.851	259.94	-52.70	0.367	
2600.0	2634.6	3.180	2.964	34.959	27.856	260.47	-53.04	0.367	
2700.0	2736.6	3.079	2.854	34.952	27.861	261.16	-53.15	0.366	
2800.0	2838.6	3.014	2.780	34.950	27.866	261.12	-53.70	0.366	
2900.0	2940.7	2.892	2.650	34.942	27.870	262.11	-53.70	0.366	
3000.0	3042.8	2.793	2.542	34.935	27.874	263.13	-53.47	0.366	
3100.0	3144.9	2.708	2.448	34.930	27.879	264.02	-53.27	0.365	
3200.0	3247.2	2.630	2.362	34.925	27.882	264.49	-53.43	0.365	
3300.0	3349.4	2.547	2.270	34.920	27.886	264.65	-53.94	0.365	
3400.0	3451.7	2.469	2.183	34.915	27.889	265.19	-54.05	0.364	
3500.0	3554.1	2.411	2.114	34.911	27.891	264.93	-54.79	0.364	
3600.0	3656.5	2.359	2.053	34.907	27.893	264.91	-55.23	0.364	
3700.0	3758.9	2.316	2.000	34.903	27.894	264.72	-55.78	0.365	
3800.0	3861.4	2.284	1.958	34.900	27.895	264.26	-56.50	0.366	
3900.0	3964.0	2.263	1.926	34.897	27.895	263.99	-56.95	0.366	
4000.0	4066.5	2.249	1.900	34.895	27.896	263.13	-57.93	0.367	
4100.0	4169.2	2.231	1.871	34.892	27.896	262.34	-58.88	0.372	
4200.0	4271.8	2.230	1.858	34.891	27.896	261.96	-59.26	0.374	

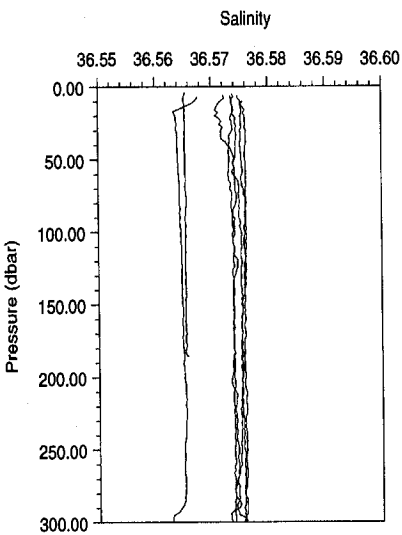
BATS 66—CTD Temperature Profiles



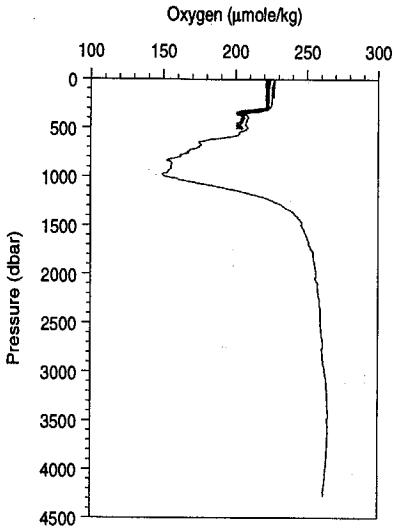


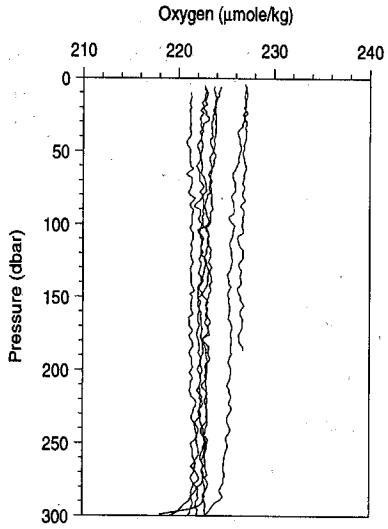
BATS 66—CTD Salinity Profiles



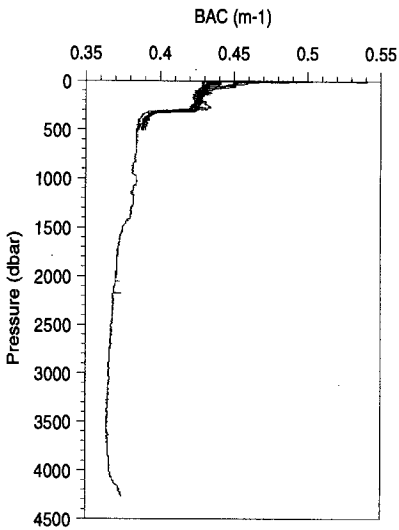


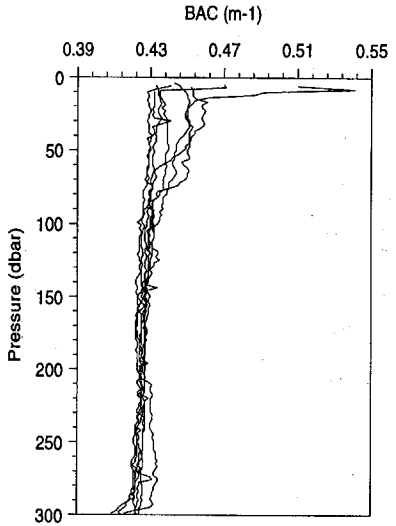
BATS 66—CTD Oxygen Profiles



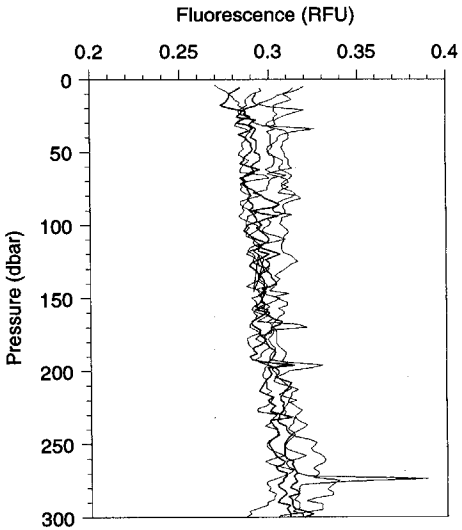


BATS 66—CTD BAC Profiles

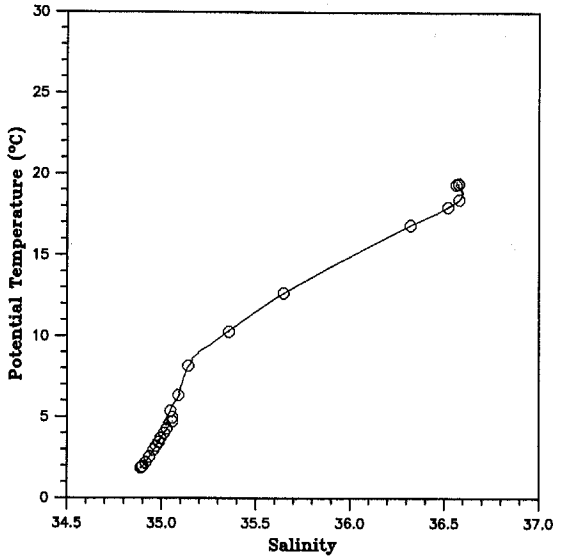




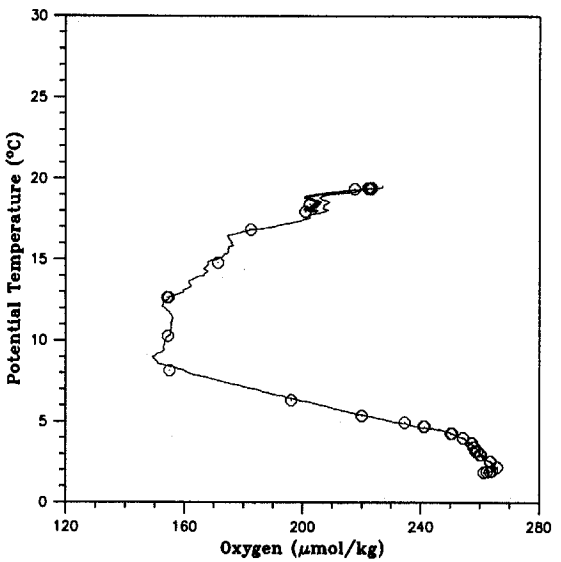
BATS 66—CTD Fluorescence Profiles



BATS 66—T-S Diagram



BATS 66—T-O Diagram



BATS 66—Bottle Data
March 14- 21, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10660701	4.1	4.2	19.399	36.576	19.399	36.576	26.124
10660702	4.5	4.6	19.398	36.576	19.398		26.125
10660703	12.0	12.1	19.397	36.576	19.395	36.576	26.125
10660704	12.3	12.4	19.395	36.576	19.392		26.126
10660706	19.9	20.1	19.392	36.576	19.388		26.127
10660705	20.1	20.2	19.392	36.576	19.388	36.576	26.127
10660707	40.4	40.7	19.391	36.576	19.383	36.575	26.128
10660708	41.0	41.3	19.388	36.576	19.381		26.129
10660710	58.3	58.7	19.385	36.576	19.375		26.130
10660709	59.7	60.1	19.387	36.576	19.376		26.130
10660711	81.7	82.2	19.388	36.575	19.373	36.575	26.130
10660712	82.1	82.7	19.388	36.576	19.373		26.131
10660714	98.8	99.5	19.391	36.575	19.373		26.130
10660713	99.5	100.2	19.391	36.575	19.373	36.575	26.130
10660716	124.0	124.9	19.393	36.575	19.370		26.131
10660715	124.7	125.6	19.393	36.575	19.370		26.131
10660717	137.8	138.9	19.396	36.575	19.371	36.575	26.131
10660718	139.4	140.5	19.397	36.575	19.371		26.131
10660719	159.6	160.8	19.401	36.575	19.372	36.574	26.130
10660720	160.4	161.6	19.401	36.575	19.371		26.130
10660722	203.0	204.5	19.406	36.575	19.369		26.131
10660721	203.5	205.0	19.407	36.575	19.369	36.577	26.132
10660723	254.6	256.5	19.416	36.575	19.369	36.574	26.131
10660724	255.0	257.0	19.415	36.574	19.368		26.131
10660201	304.0	306.4	19.394	36.564	19.338	36.563	26.130
10660202	402.0	405.2	18.486	36.579	18.414	36.580	26.380
10660203	501.9	506.0	18.039	36.517	17.951	36.519	26.450
10660204	600.7	605.8	16.933	36.321	16.831	36.321	26.570
10660205	703.9	710.0	14.888	35.976	14.779		26.774
10660206	800.3	807.5	12.764	35.648	12.652	35.647	26.965
10660207	901.3	909.6	10.386	35.354	10.274	35.357	27.184
10660208	998.6	1008.1	8.254	35.141	8.145	35.141	27.363
10660209	1104.6	1115.3	6.430	35.089	6.323	35.089	27.581
10660210	1199.2	1211.1	5.472	35.047	5.364	35.047	27.670
10660211	1302.9	1316.1	5.067	35.057	4.953	35.058	27.727
10660212	1400.2	1414.8	4.836	35.057	4.714	35.058	27.754
10660213	1604.5	1622.0	4.413	35.026	4.277	35.027	27.779
10660214	1799.4	1819.9	4.156	35.013	4.004	35.014	27.797
10660215	2001.0	2024.8	3.852	34.994	3.684	34.994	27.814
10660216	2202.9	2230.1	3.617	34.984	3.433	34.985	27.832
10660217	2398.5	2429.3	3.400	34.971	3.199	34.971	27.843
10660218	2599.7	2634.2	3.176	34.959	2.960	34.958	27.855
10660219	3000.5	3043.3	2.793	34.935	2.542		27.875
10660220	3001.3	3044.1	2.793	34.935	2.542	34.935	27.875
10660221	3399.1	3450.8	2.468	34.915	2.182	34.915	27.889
10660222	3800.4	3861.8	2.279	34.899	1.953	34.899	27.895
10660223	3999.4	4066.0	2.248	34.895	1.899	34.895	27.895
10660224	4201.5	4273.3	2.230	34.891	1.857	34.889	27.894

BATS 66—Bottle Data
March 14- 21, 1994
Gases

Bottle ID	Depth (m)	O_2(1) (μmole/kg)	O_2(2) (μmole/kg)	O_2(1) anomaly (μmole/kg)	O_2(2) anomaly (μmole/kg)	TCO_2 (μmole/kg)
20650201	3.6	227.61	227.39	8.84	8.62	
10660701	4.1	222.09	223.44	2.55	3.90	2058
10660703	12.0	222.43	223.09	2.89	3.55	2058
10660705	20.1	223.17	223.00	3.61	3.44	2058
10660707	40.4	222.60	223.43	3.04	3.86	2058
10660709	59.7	222.57	222.74	2.98	3.16	2058
10660711	81.7	222.35	222.22	2.77	2.64	2058
10660713	99.5	222.52	222.39	2.95	2.82	2057
10660715	124.7	222.22	222.44	2.66	2.88	2060
10660717	137.8	222.48	222.48	2.93	2.93	2058
10660719	159.6	222.52	222.39	3.00	2.86	2059
10660721	203.5	222.96	222.39	3.45	2.89	2057
10660723	254.6	222.34	222.99	2.87	3.52	2058
10660201	304.0	217.58	217.71	-1.99	-1.86	
10660202	402.0	202.53	202.39	-20.69	-20.82	
10660203	501.9	200.90	200.99	-24.26	-24.18	
10660204	600.7	182.55	182.46	-47.67	-47.75	
10660205	703.9	171.45	171.32	-68.65	-68.78	
10660206	800.3	154.22	154.74	-96.98	-96.45	
10660207	901.3	154.46	154.37	-110.19	-110.27	
10660208	998.6	154.98	154.98	-122.80	-122.80	
10660209	1104.6	196.14	196.10	-93.55	-93.60	
10660210	1199.2	219.91	220.13	-76.46	-76.24	
10660211	1302.9	234.54		-64.67		
10660212	1400.2	241.30	240.90	-59.57	-59.96	
10660213	1604.5	250.68	250.11	-53.34	-53.91	
10660214	1799.4	254.33	254.20	-51.62	-51.75	
10660215	2001.0	257.42	257.07	-50.86	-51.21	
10660216	2202.9	258.15	257.80	-51.93	-52.28	
10660217	2398.5	259.20	258.41	-52.58	-53.36	
10660218	2599.7	260.41	259.97	-53.13	-53.56	
10660219	3000.5	263.38	263.68	-53.22	-52.92	
10660220	3001.3		263.51		-53.09	
10660221	3399.1	265.73	265.90	-53.51	-53.34	
10660222	3800.4	264.24	264.15	-56.56	-56.65	
10660223	3999.4	263.46	262.32	-57.62	-58.75	
10660224	4201.5	261.30	261.30	-59.93	-59.93	

BATS 66—Bottle Data
March 14- 21, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10660702	4.5	0.45	0.16	0.00	1.0
10660703	12.0	0.53	0.17	0.00	0.9
10660705	20.1	0.43	0.15	0.00	0.9
10660707	40.4	0.41	0.14	0.00	0.9
10660709	59.7	0.45	0.16	0.00	0.9
10660711	81.7	0.49	0.17	0.00	0.9
10660713	99.5	0.43	0.14	0.00	1.0
10660715	124.7	0.49	0.17	0.00	0.9
10660717	137.8	0.50	0.17	0.05	0.9
10660719	159.6	0.52	0.17	0.00	0.9
10660721	203.5	0.48	0.17	0.00	0.8
10660724	255.0	0.50	0.17	0.00	0.8
10660201	304.0	0.93	0.09	0.04	1.2
10660202	402.0	3.10	0.00	0.16	1.7
10660203	501.9	4.29	0.00	0.22	1.9
10660204	600.7	7.66	0.00	0.44	3.2
10660205	703.9	12.14	0.00	0.75	5.5
10660206	800.3	17.13	0.00	1.11	9.3
10660207	901.3	19.81	0.00	1.34	12.5
10660208	998.6	21.92	0.00	1.54	16.5
10660209	1104.6	21.15	0.00	1.48	15.1
10660210	1199.2	18.68	0.00	1.31	14.4
10660211	1302.9	17.85	0.00	1.24	13.8
10660212	1400.2	18.00	0.00	1.27	14.1
10660213	1604.5		0.00		14.3
10660214	1799.4	18.30	0.00	1.28	15.1
10660215	2001.0	18.30	0.00	1.29	16.1
10660216	2202.9	18.35	0.00	1.29	17.9
10660217	2398.5	18.34	0.00	1.22	19.5
10660218	2599.7	18.34	0.00	1.27	21.4
10660219	3000.5	18.25	0.00		23.6
10660220	3001.3		0.00	1.29	23.6
10660221	3399.1		0.00	1.31	27.0
10660222	3800.4	18.30	0.00	1.35	32.1
10660223	3999.4	18.96	0.00	1.38	34.5
10660224	4201.5	19.37	0.00	1.43	37.0

BATS 66—Bottle Data
March 14- 21, 1994
Fluorometric Pigments, Particulates and Bacterial Abundance

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10660702	4.5	22.57	4.29	4.43	0.234	0.019
10660704	12.3	17.98	3.70	5.04	0.243	0.058
10660706	19.9	23.35	4.96	5.30	0.292	0.010
10660708	41.0	23.40	4.10	4.21	0.282	0.000
10660710	58.3	15.44	3.37	4.58	0.321	0.000
10660712	82.1	21.37	4.36	4.93	0.234	0.049
10660714	98.8	26.98	4.36	5.06	0.195	0.097
10660716	124.0	24.67	5.22	5.77	0.243	0.000
10660718	139.4	22.54	4.76	5.13	0.263	0.000
10660720	160.4	27.89	5.03	5.04	0.282	0.000
10660722	203.0	18.33	4.23	4.93	0.302	0.000
10660724	255.0	20.71	4.23	5.27	0.321	0.000
10660201	304.0	11.04	2.91	4.38		
10660202	402.0	3.87	1.06	0.89		
10660203	501.9	4.24	0.99			
10660204	600.7	4.37	0.66			
10660205	703.9	3.75	1.06			
10660206	800.3	5.41	0.80			
10660207	901.3	5.01	0.66			
10660208	998.6	5.34	0.33			
10660209	1104.6			0.60		
10660212	1400.2			0.31		
10660219	3000.5			0.17		
10660223	3999.4			0.38		

BATS 66—Bottle Data
March 14- 21, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10660702	4.5	10	18	5	44	13	20	162	1
10660704	12.3	11	18	5	51	15	24	173	0
10660706	19.9	13	20	5	53	18	23	188	0
10660708	41.0	13	20	5	55	16	28	191	9
10660710	58.3	12	19	5	50	15	21	164	2
10660712	82.1	11	19	5	48	15	21	172	0
10660714	98.8	11	20	5	51	17	23	179	0
10660716	124.0	8	18	5	47	8	21	163	0
10660718	139.4	10	19	5	47	8	20	171	0
10660720	160.4	10	19	5	47	9	23	170	0
10660722	203.0	9	17	5	46	8	17	149	0
10660724	255.0	9	19	5	47	8	20	167	8

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10660702	4.5	7	0	0	4	14	10	1
10660704	12.3	9	0	0	5	16	10	2
10660706	19.9	9	0	0	6	11	10	0
10660708	41.0	8	0	0	3	9	11	0
10660710	58.3	10	0	0	5	7	8	0
10660712	82.1	8	0	0	7	4	8	0
10660714	98.8	9	0	0	5	5	8	0
10660716	124.0	7	0	0	6	5	7	0
10660718	139.4	5	0	0	5	4	7	0
10660720	160.4	6	0	0	7	3	8	0
10660722	203.0	7	0	0	4	3	7	0
10660724	255.0	7	0	0	6	0	5	0

BATS 66: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	11.84	11.63		0.33	0.65	0.65	0.65	0.55
20	5.53			0.31	0.11	0.28	0.27	0.29
40	7.82	7.71	5.75	0.23	0.18	0.45	0.60	0.68
60	3.39	3.02	2.39	0.25	0.50	0.62	0.56	0.59
80	1.20	1.10	1.05	0.29	0.65	0.76	0.55	
100	0.44	0.39	0.40	0.22	0.67		0.26	0.23
120	0.31	0.27	0.26	0.23	0.61			
140	0.27	0.22	0.24	0.18	0.20		0.11	

BATS 66: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	334	231.02	50.06	11.00
150	335	290.26	71.27	16.25
150	336	306.76	69.43	14.96
200	337	307.18	76.10	17.29
200	338	259.37	61.57	14.14
200	339	283.49	64.22	14.26
300	340	288.99	55.28	12.15
300	341	308.03	77.08	17.98
300	342	269.10	62.29	14.10

BATS 67

Cruise Report
Cruise dates: April 17-22, 1994
Personnel: K. Gundersen, A. Close, F. Howse, R. Little, P. Countway, L. Banghart, R. Phyliky, B. Cullen.
R/V Weatherbird II

18 April 1994

0700 - Depart BBSR.

1325 - Deploy PITs. Lat: 31.757 N; Long: 64.159 W

1344 - BBOP cast. Lat: 31.761N; Long: 64.156W

1423 - **CTD cast 1**, 500 m cast.
Lat: 31.765 N; Long: 64.147 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 150, 150, 150, 150, 150, 150, 150, 150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

1540 - CTD cast 1 on deck. Lat: 31.764 N; Long: 64.122 W

1612 - BBOP cast. Lat: 31.768N; Long: 64.148W

1650 - **CTD cast 2**, 4200 m cast.
Lat: 31.772 N; Long: 64.135 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 1400, 2000, 2600, 3000 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000, 3400 and 3800 m.

2025 - CTD cast 2 on deck. Lat: 31.765 N; Long: 64.114 W

2048 - BBOP cast. Lat: 31.760 N; Long: 64.134 W

2114 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.692 N; Long: 64.135 W

2142 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.757 N; Long: 64.136 W

2211 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.757 N; Long: 64.136 W

2232 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.753 N; Long: 64.133 W

2301 - BBOP cast. Lat: 31.753 N; Long: 64.131 W

19 April 1994

0130 - **GoFlo cast #1** (Lipschultz). Lat: 31.731 N; Long: 64.114 W

0400 - **GoFlo cast #2**, 140 m.
Lat: 31.764 N; Long: 64.107 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0600 - Deploy primary production array.
Lat: 31.751 N; Long: 64.010 W

0609 - BBOP cast. Lat: 31.750 N; Long: 64.100 W

0708 - **CTD cast 3**, 500 m cast.
Lat: 31.751 N; Long: 64.102 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120,140, 140, 140, 140, 140, 140, 140, 160 m.

Samples taken:

acantharia (Michaels)	top 10 depths

0803 - CTD cast 3 on board. Lat: 31.762 N; Long: 64.101 W

0833 - BBOP cast. Lat: 31.758 N; Long: 64.101 W

0924 - BBOP cast. Lat: 31.769 N; Long: 64.107 W

1024 - BBOP cast. Lat: 31.758 N; Long: 64.084 W

1052 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.756 N; Long: 64.080 W

1125 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.761 N; Long: 64.089 W

1100 - Begin Wakeham pumping. Lat: 31.756 N; Long: 64.080 W

1200 - BBOP cast. Lat: 31.777 N; Long: 64.088 W

1228 - **CTD cast 4**, 500 m cast.
Lat: 31.757 N; Long: 64.088 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths
DIC	12 depths; replicates at 1, 20, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths
chl *a* (BBOP)	12 depths
DOM (Nelson)	12 depths

1331 - CTD cast 4 on deck. Lat: 31.752 N; Long: 64.090 W

1338 - BBOP cast. Lat: 31.752 N; Long: 64..089 W

1453 - End Wakeham pumping.

1456 - BBOP cast. Lat: 31.754 N; Long: 64.094 W

1639 - BBOP cast. Lat: 31.770 N; Long: 64.084 W

1704 - **CTD cast 5**, 500 m. Lat: 31.771 N; Long: 64.084 W
Calibration cast. No bottles fired.

1725 - CTD cast 5 on deck. Lat: 31.770 N; Long: 63.085 W

1730 - **CTD cast 6**, 500 m cast.
Lat: 31.770 N; Long: 64.085 W
Nominal depths: 1, 1, 1, 10, 20, 30, 40, 50, 60, 60, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 200, 200, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
dissolved I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m.
particulate I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, and 200 m.

1836 - CTD cast 6 on deck. Lat: 31.767 N; Long: 64.087 W

1847 - BBOP cast. Lat: 31.676 N; Long: 64.085 W

1951 - BBOP cast. Lat: 31.779 N; Long: 64.055 W

2035 - Recover primary production array.
Lat: 31.782 N; Long: 64.089 W

2038 - BBOP cast. Lat: 31.782 N; Long: 64.048 W

2120 - Depart for Station S.

20 April 1994

0041 - **HS 764 CTD cast,** 2600m. Lat: 32.169 N; Long: 64.500 W

0325 - HS 764 CTD cast on deck. Lat: 32.170 N; Long: 64.501 W

0400 - BBOP cast. Lat: 31.171 N; Long: 64.501 W

0458 - **CTD cast 7**, 250 m cast.
Lat: 32.172 N; Long: 64.501 W
Nominal depths: 1, 1, 5, 5, 10, 10, 15, 15, 20, 20, 30, 30, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

0555 - CTD cast 7 on deck. Lat: 32.172 N; Long: 64.501 W

0600 - Depart for BBSR.

0850 - Arrive BBSR.

2200 - Depart BBSR.

21 April 1994

0315 - Arrive at PITS location.

0455 - BBOP cast. Lat: 31.881 N; Long: 64.108 W

0701 - BBOP cast. Lat: 31.894 N; Long: 64.095 W

0805 - **CTD cast 8**, 500 m cast.
Lat: 31.882 N; Long: 64.131 W
Nominal depths: 1, 1, 1, 1, 1, 10, 10, 10, 10, 10, 50, 100, 150, 200, 200, 300, 350, 400, 500, 600, 700, 800, 900 and 1000 m.

Samples taken:

Lipshultz	top 16 depths
Elardo	1 and 10 m

0933 - CTD cast 8 on deck. Lat: 31.896 N; Long: 64.078 W

1016 - BBOP cast. Lat: 31.885 N; Long: 64.128 W

1130 - BBOP cast. Lat: 31.883 N; Long: 64.128 W

1200 - BBOP cast. Lat: 31.883 N; Long: 64.131 W

1245 - Plankton tow (Elardo), surface (330 µm net).

1258 - **CTD cast 9**, 500 m cast.
Lat: 31.882 N; Long: 64.131 W
Nominal depths: 1,10, 10, 10, 10, 10, 10, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 200, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

1406 - CTD cast 9 on deck. Lat: 31.881 N; Long: 64.131 W

1435 - BBOP cast. Lat: 31.882 N; Long: 64.130 W

1515 - **CTD cast 10**, 500 m cast.
Lat: 31.887 N; Long: 64.127 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 250 m.

Samples taken:

exoenzyme (Gundersen)	top 8 depths
^{3}H-leucine (Gundersen)	top 8 depths
chl *a* (BBOP)	8 depths

1615 - CTD cast 10 on deck. Lat: 31.893 N; Long: 64.124 W

1637 - BBOP cast. Lat: 31.894 N; Long: 64.122 W

1753 - **CTD cast 11**, 500 m cast.
Lat: 31.894 N; Long: 64.145 W
Nominal depths: 10,10,10,10,10,10, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 60, 100, 100, 100, 100, 100, 100 m.

Samples taken:

DOC/dregs expt.	60m

1855 - CTD cast 11 on deck. Lat: 31.898 N; Long: 64.140 W

1857 - BBOP cast. Lat: 31.899 N; Long: 64.139 W

1950 - Recover PITs. Lat: 31.903 N; Long: 64.144 W

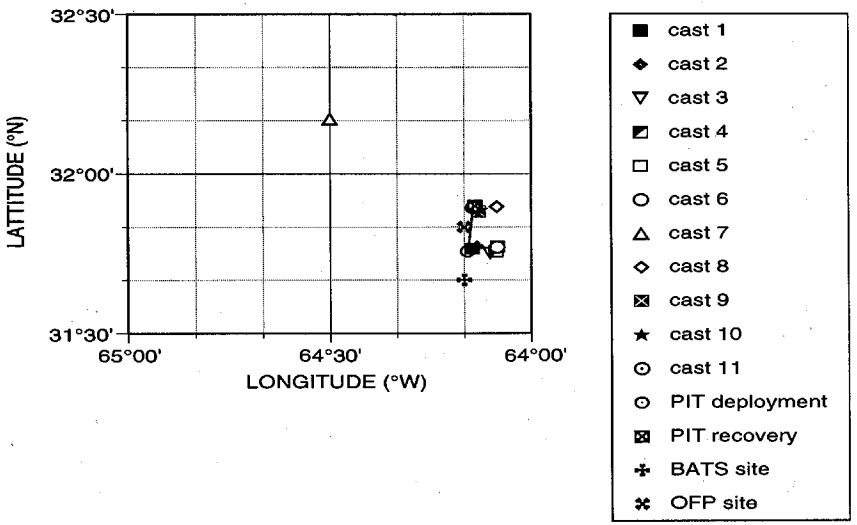
2055 - **GoFlo cast #3** (DiTullio). Lat: 31.731 N; Long: 64.114 W

2100 - Depart for BBSR

22 April 1994

0200 - Arrive BBSR.

Cast positions: BATS 67

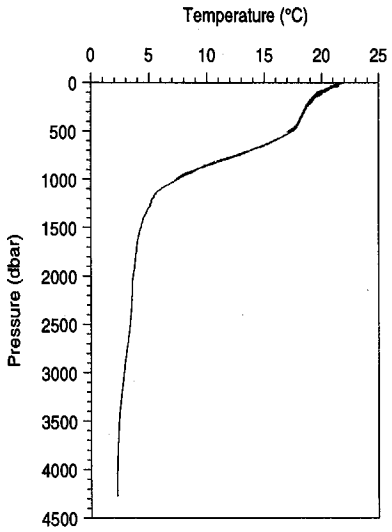


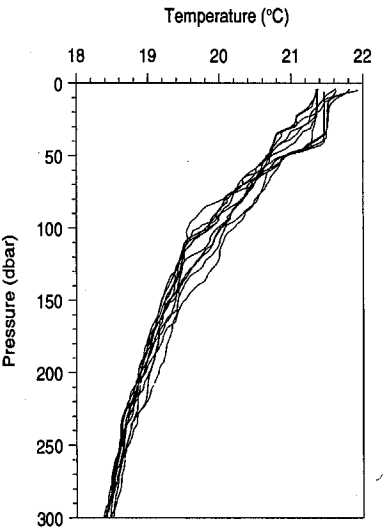
BATS 67, CTD Cast 2
April 18, 1994
Start cast: time: 1650 lat: 31.772 N long: 64.135 W
End cast: time: 2025 lat: 31.765 N long: 64.114 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
4.0	4.0	21.377	21.376	36.740	25.717	220.72	9.03	0.451	
10.0	10.1	21.331	21.329	36.733	25.724	220.70	8.82	0.450	
20.0	20.1	21.165	21.161	36.709	25.753	220.96	8.43	0.451	
30.0	30.2	20.985	20.979	36.698	25.794	221.05	7.82	0.455	
40.0	40.3	20.760	20.753	36.688	25.849	221.46	7.38	0.455	
50.0	50.4	20.707	20.697	36.687	25.863	221.24	6.96	0.451	
60.0	60.4	20.559	20.547	36.671	25.892	221.17	6.29	0.456	
70.0	70.5	20.262	20.248	36.642	25.950	220.79	4.73	0.462	
80.0	80.6	20.112	20.097	36.637	25.987	220.37	3.73	0.465	
90.0	90.6	19.963	19.946	36.624	26.017	220.54	3.30	0.469	
100.0	100.7	19.687	19.669	36.597	26.070	221.81	3.45	0.465	
110.0	110.8	19.552	19.532	36.589	26.099	222.02	3.11	0.454	
120.0	120.9	19.459	19.437	36.591	26.126	220.60	1.33	0.460	
130.0	131.0	19.382	19.358	36.585	26.142	219.13	-0.45	0.441	
140.0	141.0	19.335	19.310	36.587	26.156	219.04	-0.73	0.437	
150.0	151.1	19.243	19.216	36.589	26.181	215.37	-4.77	0.422	
160.0	161.2	19.186	19.157	36.589	26.197	215.31	-5.05	0.417	
170.0	171.3	19.150	19.119	36.594	26.211	215.25	-5.24	0.418	
180.0	181.3	19.129	19.096	36.601	26.222	217.34	-3.23	0.431	
190.0	191.4	19.087	19.053	36.604	26.235	216.69	-4.05	0.427	
200.0	201.5	19.008	18.972	36.599	26.252	215.43	-5.63	0.420	
210.0	211.6	18.929	18.891	36.586	26.263	209.46	-11.94	0.403	
220.0	221.7	18.810	18.770	36.589	26.296	211.12	-10.76	0.406	
230.0	231.7	18.731	18.690	36.583	26.313	209.01	-13.20	0.402	
240.0	241.8	18.660	18.617	36.584	26.332	213.63	-8.86	0.405	
250.0	251.9	18.650	18.605	36.584	26.335	212.65	-9.89	0.404	
275.0	277.1	18.521	18.472	36.581	26.366	205.97	-17.10	0.398	
300.0	302.3	18.412	18.359	36.572	26.388	203.95	-19.58	0.396	
325.0	327.5	18.332	18.275	36.563	26.402	203.73	-20.14	0.396	
350.0	352.7	18.189	18.127	36.543	26.424	203.31	-21.18	0.395	
375.0	378.0	18.096	18.030	36.530	26.438	203.38	-21.53	0.394	
400.0	403.2	17.987	17.917	36.514	26.454	202.19	-23.19	0.394	
425.0	428.4	17.868	17.793	36.497	26.471	200.67	-25.24	0.394	
450.0	453.6	17.741	17.663	36.475	26.487	199.09	-27.40	0.393	
475.0	478.9	17.592	17.510	36.447	26.503	196.66	-30.50	0.392	
500.0	504.1	17.303	17.217	36.393	26.533	192.35	-36.14	0.392	
550.0	554.6	16.626	16.534	36.272	26.603	184.67	-46.98	0.391	
600.0	605.1	15.686	15.590	36.115	26.701	178.44	-57.71	0.390	
650.0	655.6	14.706	14.606	35.953	26.794	171.35	-69.66	0.389	
700.0	706.1	13.662	13.559	35.788	26.889	164.58	-81.82	0.388	
750.0	756.6	12.538	12.434	35.626	26.991	157.06	-95.35	0.388	
800.0	807.2	11.261	11.157	35.455	27.102	154.97	-104.59	0.388	
850.0	857.7	10.032	9.929	35.308	27.205	153.85	-112.92	0.388	
900.0	908.3	9.035	8.932	35.209	27.294	156.78	-116.07	0.388	
950.0	958.9	8.075	7.972	35.155	27.400	165.91	-112.95	0.386	
1000.0	1009.4	7.306	7.204	35.130	27.493	178.77	-105.04	0.384	
1050.0	1060.0	6.595	6.493	35.091	27.560	190.92	-97.66	0.386	
1100.0	1110.7	5.943	5.841	35.062	27.622	204.81	-88.26	0.386	
1150.0	1161.3	5.472	5.369	35.046	27.668	216.58	-79.79	0.384	
1200.0	1211.9	5.223	5.117	35.051	27.702	225.40	-72.72	0.383	
1300.0	1313.2	4.874	4.761	35.045	27.739	237.21	-63.42	0.379	

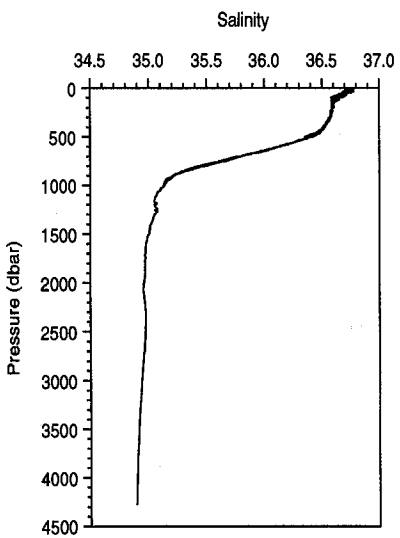
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.475	4.358	35.012	27.757	247.73	-55.86	0.378	
1500.0	1516.0	4.236	4.112	34.992	27.768	253.33	-52.08	0.375	
1600.0	1617.4	4.049	3.918	34.976	27.776	258.01	-48.83	0.375	
1700.0	1718.9	3.912	3.772	34.966	27.783	260.80	-47.09	0.373	
1800.0	1820.5	3.826	3.678	34.967	27.793	261.97	-46.57	0.372	
1900.0	1922.1	3.747	3.590	34.968	27.803	262.67	-46.47	0.371	
2000.0	2023.7	3.593	3.429	34.955	27.809	264.44	-45.90	0.371	
2100.0	2125.4	3.548	3.375	34.960	27.818	264.25	-46.42	0.369	
2200.0	2227.2	3.524	3.342	34.966	27.826	263.35	-47.49	0.367	
2300.0	2328.9	3.481	3.290	34.971	27.835	262.24	-48.91	0.366	
2400.0	2430.8	3.407	3.206	34.971	27.843	261.74	-49.98	0.367	
2500.0	2532.7	3.329	3.120	34.969	27.849	261.13	-51.20	0.367	
2600.0	2634.6	3.210	2.992	34.961	27.855	261.43	-51.84	0.366	
2700.0	2736.6	3.109	2.883	34.955	27.860	261.62	-52.45	0.366	
2800.0	2838.6	3.009	2.775	34.949	27.865	262.26	-52.61	0.365	
2900.0	2940.7	2.899	2.656	34.942	27.870	262.98	-52.76	0.365	
3000.0	3042.8	2.814	2.563	34.937	27.874	263.45	-52.98	0.365	
3100.0	3144.9	2.712	2.452	34.931	27.879	264.04	-53.22	0.365	
3200.0	3247.2	2.614	2.346	34.925	27.883	264.80	-53.25	0.365	
3300.0	3349.4	2.518	2.242	34.919	27.887	264.71	-54.12	0.365	
3400.0	3451.7	2.450	2.164	34.914	27.890	265.47	-53.92	0.365	
3500.0	3554.1	2.394	2.099	34.910	27.892	265.54	-54.30	0.365	
3600.0	3656.5	2.362	2.056	34.908	27.893	265.19	-54.92	0.364	
3700.0	3758.9	2.320	2.004	34.904	27.895	264.95	-55.51	0.365	
3800.0	3861.4	2.291	1.964	34.901	27.895	264.57	-56.14	0.365	
3900.0	3964.0	2.265	1.927	34.898	27.896	264.38	-56.55	0.366	
4000.0	4066.5	2.247	1.899	34.895	27.896	263.63	-57.45	0.367	
4100.0	4169.2	2.239	1.878	34.893	27.896	262.87	-58.28	0.371	
4200.0	4271.8	2.234	1.861	34.891	27.896	262.37	-58.82	0.374	

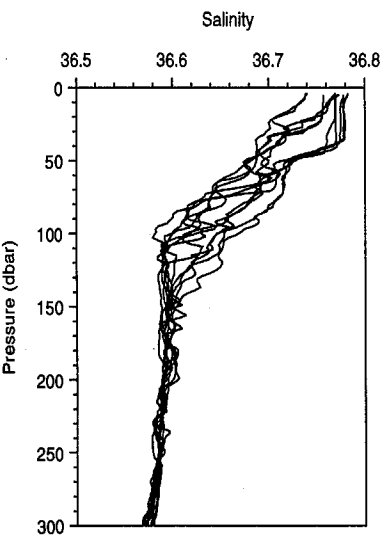
BATS 67—CTD Temperature Profiles



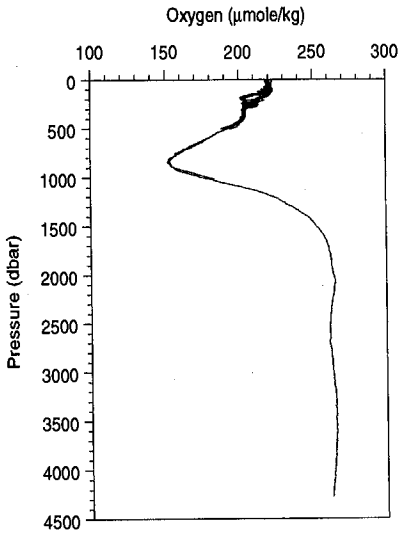


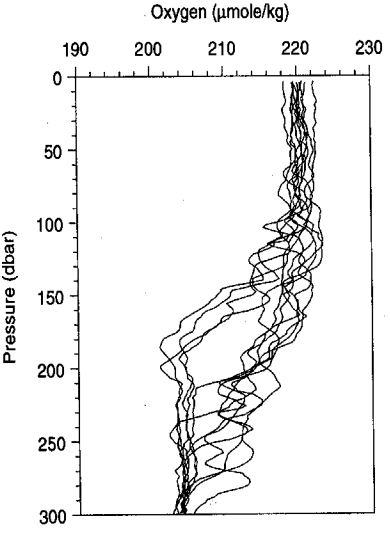
BATS 67—CTD Salinity Profiles



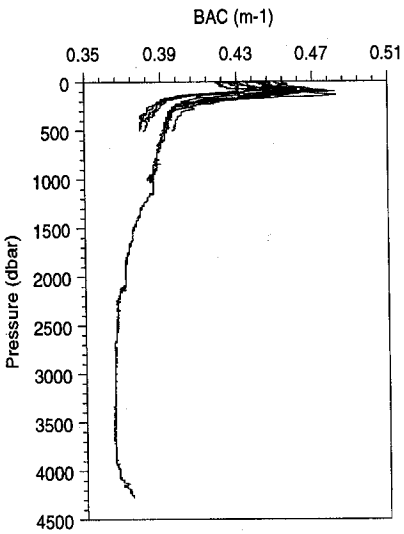


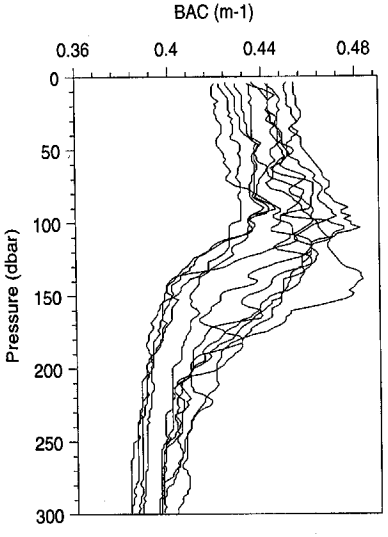
BATS 67—CTD Oxygen Profiles



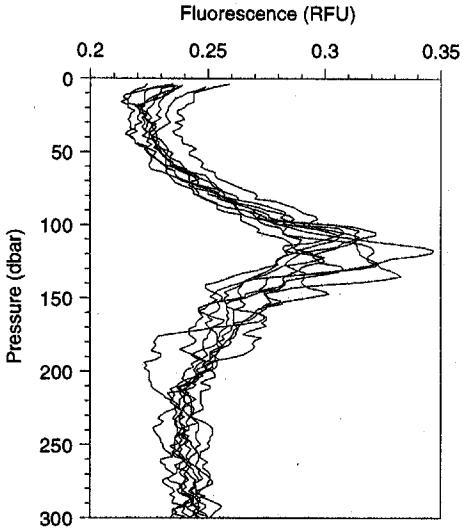


BATS 67—CTD BAC Profiles

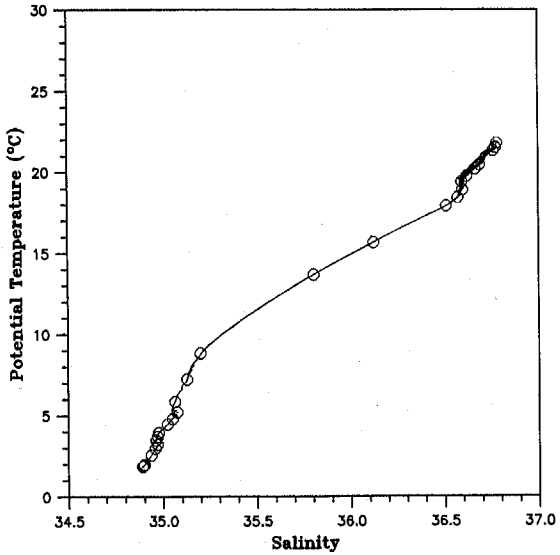




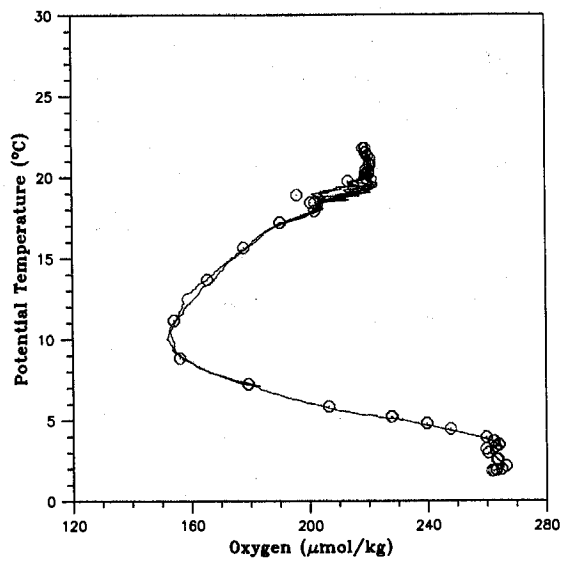
BATS 67—CTD Fluorescence Profiles



BATS 67—T-S Diagram



BATS 67—T-O Diagram



BATS 67—Bottle Data
April 18-22, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10670402	1.6	1.6	21.780	36.781	21.780		25.636
10670401	1.7	1.7	21.780	36.781	21.780	36.783	25.637
10670404	11.2	11.3	21.533	36.777	21.531		25.702
10670403	11.4	11.4	21.532	36.777	21.530	36.777	25.702
10670405	20.4	20.5	21.510	36.776	21.506	36.776	25.708
10670406	20.6	20.8	21.509	36.776	21.505		25.708
10670408	40.5	40.8	21.337	36.761	21.330		25.746
10670407	40.6	40.9	21.325	36.760	21.317	36.764	25.752
10670409	60.3	60.7	20.800	36.714	20.789		25.859
10670410	60.6	61.0	20.791	36.713	20.779		25.861
10670412	79.6	80.2	20.459	36.692	20.444		25.935
10670411	80.6	81.2	20.458	36.692	20.443	36.690	25.934
10670414	100.3	101.0	20.202	36.669	20.183		25.988
10670413	100.4	101.1	20.202	36.669	20.183	36.667	25.987
10670416	120.8	121.6	19.958	36.643	19.936		26.034
10670415	121.0	121.9	19.957	36.642	19.934		26.034
10670418	140.7	141.7	19.775	36.624	19.749		26.069
10670417	141.2	142.2	19.774	36.624	19.748	36.623	26.069
10670420	160.9	162.1	19.413	36.597	19.384		26.144
10670419	161.2	162.4	19.415	36.597	19.385	36.596	26.143
10670422	200.8	202.3	18.936	36.601	18.899		26.272
10670421	201.3	202.8	18.929	36.600	18.893	36.600	26.273
10670424	251.1	253.0	18.589	36.581	18.545		26.348
10670201	301.3	303.6	18.479	36.575	18.425	36.574	26.373
10670202	401.3	404.5	17.976	36.513	17.906	36.513	26.456
10670203	502.1	506.3	17.286	36.389	17.200		26.534
10670204	600.6	605.7	15.748	36.123	15.652	36.125	26.694
10670205	701.1	707.2	13.771	35.806	13.668	35.805	26.880
10670206	801.5	808.7	11.250	35.450	11.146		27.100
10670207	900.9	909.1	8.938	35.202	8.835	35.201	27.303
10670208	1000.7	1010.1	7.337	35.129	7.234	35.129	27.488
10670209	1100.7	1111.3	5.960	35.065	5.857	35.066	27.623
10670210	1201.0	1212.9	5.324	35.074	5.217	35.076	27.710
10670211	1300.7	1313.9	4.909	35.049	4.796	35.052	27.740
10670212	1401.5	1416.1	4.581	35.023	4.462	35.024	27.756
10670213	1601.6	1619.0	4.065	34.977	3.933	34.977	27.775
10670214	1804.1	1824.7	3.854	34.971	3.705	34.972	27.794
10670215	2003.5	2027.3	3.645	34.964	3.480	34.964	27.811
10670216	2199.5	2226.7	3.530	34.966	3.348		27.825
10670217	2400.6	2431.4	3.413	34.972	3.213	34.971	27.842
10670218	2599.0	2633.6	3.184	34.960	2.967	34.959	27.855
10670220	2998.9	3041.6	2.812	34.937	2.561	34.937	27.874
10670219	2999.6	3042.4	2.811	34.937	2.560		27.874
10670221	3402.6	3454.4	2.443	34.914	2.157		27.890
10670222	3802.3	3863.8	2.292	34.901	1.965	34.900	27.894
10670223	3999.9	4066.4	2.247	34.895	1.898	34.895	27.896
10670224	4204.5	4276.5	2.233	34.891	1.860	34.891	27.895

BATS 67—Bottle Data
April 18-22, 1994
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10670401	1.7	218.54	219.24	8.39	9.08	2049
10670403	11.4	219.28	219.32	8.21	8.25	2049
10670405	20.4	219.53	219.31	8.38	8.16	2049
10670407	40.6	219.96	220.09	8.10	8.23	2048
10670409	60.3	220.77	220.99	6.88	7.10	2053
10670411	80.6	219.45	219.54	4.22	4.31	2056
10670413	100.4	219.71	219.27	3.47	3.03	2057
10670415	121.0	219.48	219.61	2.24	2.37	2058
10670417	141.2	213.43	213.39	-4.55	-4.59	2066
10670419	161.2	215.51	215.33	-3.93	-4.10	2067
10670421	201.3	196.11	195.98	-25.26	-25.39	2087
10670201	301.3	200.74	202.09	-22.51	-21.16	
10670202	401.3	202.03	202.07	-23.41	-23.36	
10670203	502.1	190.15	190.41	-38.42	-38.16	
10670204	600.6	177.91	177.99	-57.94	-57.85	
10670205	701.1	165.63	165.54	-80.19	-80.28	
10670206	801.5	154.09	154.26	-105.54	-105.37	
10670207	900.9	156.21	156.13	-117.24	-117.33	
10670208	1000.7	179.10	179.36	-104.52	-104.26	
10670209	1100.7	206.63	206.41	-86.32	-86.53	
10670210	1201.0	227.61	228.00	-69.74	-69.35	
10670211	1300.7	239.78	239.56	-60.59	-60.80	
10670212	1401.5	247.71	247.75	-55.09	-55.05	
10670213	1601.6	259.85	259.72	-46.87	-47.00	
10670214	1804.1	262.02	262.45	-46.30	-45.87	
10670215	2003.5	263.82	264.13	-46.10	-45.80	
10670216	2199.5	262.81	262.89	-47.99	-47.90	
10670217	2400.6	259.71	259.71	-51.96	-51.96	
10670218	2599.0	260.36	260.45	-53.11	-53.02	
10670220	2998.9	263.48	263.74	-52.96	-52.70	
10670219	2999.6	263.23	263.62	-53.22	-52.83	
10670221	3402.6	266.35	266.48	-53.09	-52.96	
10670222	3802.3	264.83	265.01	-55.86	-55.69	
10670223	3999.9	263.18	262.92	-57.89	-58.16	
10670224	4204.5	262.26	261.65	-58.94	-59.55	

BATS 67—Bottle Data
April 18-22, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (μmole/kg)	Nitrite (μmole/kg)	Phosphate (μmole/kg)	Silicate (μmole/kg)
10670401	1.7	0.00	0.00	0.00	0.7
10670403	11.4	0.00	0.00	0.00	0.7
10670405	20.4	0.00	0.00	0.00	0.7
10670407	40.6	0.00	0.00	0.00	0.6
10670409	60.3	0.00	0.00	0.00	0.6
10670411	80.6	0.00	0.00	0.00	0.6
10670413	100.4	0.00	0.00	0.00	0.6
10670415	121.0	0.00	0.03	0.00	0.6
10670417	141.2	0.20	0.12	0.00	0.6
10670419	161.2	0.50	0.00	0.00	0.7
10670421	201.3	2.01	0.00	0.06	1.0
10670201	301.3	3.30	0.00	0.14	1.0
10670202	401.3	4.25	0.00	0.19	1.5
10670203	502.1	6.52	0.00	0.33	2.1
10670204	600.6	10.22	0.00	0.60	3.7
10670205	701.1	14.39	0.00	0.93	6.4
10670206	801.5	18.99	0.00	1.30	10.5
10670207	900.9	22.56	0.00	1.57	14.0
10670208	1000.7	22.05	0.00	1.57	14.5
10670209	1100.7	20.71	0.00	1.50	14.1
10670210	1201.0	19.47	0.00	1.39	13.6
10670211	1300.7	18.90	0.00	1.36	13.3
10670212	1401.5	18.02	0.00	1.29	13.0
10670213	1601.6	17.45	0.00	1.26	12.7
10670214	1804.1	17.82	0.00	1.28	13.8
10670215	2003.5	17.45	0.00	1.25	14.8
10670216	2199.5	17.50	0.00	1.27	16.0
10670217	2400.6	18.38	0.00	1.33	18.4
10670218	2599.0	17.97	0.00	1.32	20.2
10670220	2998.9	18.13	0.00	1.35	22.8
10670219	2999.6	18.33	0.00	1.35	22.7
10670221	3402.6	17.87	0.00	1.34	26.1
10670222	3802.3	18.75	0.00	1.40	30.2
10670223	3999.9	19.00	0.00	1.43	32.5
10670224	4204.5	19.42	0.00	1.47	35.0

BATS 67—Bottle Data
April 18-22, 1994
Particulates, Bacterial Abundance and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^6/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10670402	1.6	20.51	2.82	3.85	0.049	0.000
10670404	11.2	21.64	2.82	3.73	0.058	0.000
10670406	20.6	19.13	2.94	5.45	0.058	0.000
10670408	40.5	27.00	4.24	4.87	0.058	0.000
10670410	60.6	24.47	4.17	5.62	0.107	0.000
10670412	79.6	23.17	3.62	5.72	0.185	0.000
10670414	100.3	25.20	4.30	5.95	0.205	0.117
10670416	120.8	24.05	4.10	4.99	0.273	0.088
10670418	140.7	13.51	2.51	4.18	0.253	0.058
10670420	160.9	11.53	2.07	2.82	0.058	0.049
10670422	200.8	10.79	1.56	1.95	0.039	0.029
10670424	251.1	8.18	1.12	1.38	0.000	0.000
10670201	301.3	4.04	0.71	1.25		
10670202	401.3	4.81	0.71	1.28		
10670203	502.1	3.66	0.85			
10670204	600.6	12.16	1.86			
10670205	701.1	5.19	1.46			
10670206	801.5	6.87	0.57			
10670207	900.9	6.13	1.12			
10670208	1000.7	3.73	0.64			
10670209	1100.7			0.66		
10670212	1401.5			0.30		
10670219	2999.6			0.15		
10670223	3999.9			0.19		

BATS 67—Bottle Data
April 18-22, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10670402	1.6	0	2	5	10	10	0	47	0
10670404	11.2	0	3	5	8	10	0	30	0
10670406	20.6	0	1	5	7	9	0	29	0
10670408	40.5	6	4	5	11	14	0	44	0
10670410	60.6	4	6	5	17	20	7	58	0
10670412	79.6	8	14	5	37	34	11	130	6
10670414	100.3	11	20	5	50	51	44	248	18
10670416	120.8	16	33	5	65	36	84	281	21
10670418	140.7	14	47	5	48	21	103	214	19
10670420	160.9	5	21	5	17	3	27	67	6
10670422	200.8	3	8	5	17	0	18	32	0
10670424	251.1	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10670402	1.6	0	0	0	0	5	0	1
10670404	11.2	0	0	0	0	6	0	2
10670406	20.6	0	0	0	0	5	0	1
10670408	40.5	0	0	0	0	4	0	0
10670410	60.6	0	0	0	0	3	0	1
10670412	79.6	5	0	0	0	4	0	0
10670414	100.3	6	0	0	3	4	0	0
10670416	120.8	9	0	0	0	4	2	0
10670418	140.7	9	0	0	0	3	0	0
10670420	160.9	3	0	0	0	2	0	0
10670422	200.8	3	0	0	0	0	0	0
10670424	251.1	0	0	0	0	0	0	0

BATS 67: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	1.70	1.72	2.12	0.25	0.27	0.41	0.44	0.42
20	3.21	2.42	2.48	0.25	0.32	0.23	0.43	0.34
40	3.34	2.95	2.64	0.26	0.20	0.48	0.45	0.45
60	3.79	2.66	3.11	0.28	0.26	0.42	0.45	0.45
80	2.56	1.52	1.72	0.28	0.38	0.38	0.35	0.42
100	3.73	2.73	2.99	0.23	0.42	0.26	0.28	0.31
120	1.12	1.04	1.45	0.20	0.30	0.12	0.15	0.14
140	0.39	0.50	0.40	0.25	0.18	0.13	0.16	0.11

BATS 67: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	343	94.55	19.30	3.71
150	344	71.86	14.21	2.62
150	345	108.16	34.28	4.03
200	346	92.28	17.24	3.33
200	347	79.42	19.52	4.50
200	348	74.12	16.07	3.33
300	349	139.93	11.77	2.32
300	350	43.11	6.43	1.56
300	351	65.80	6.38	1.08

BATS 68

Cruise Report

Cruise dates: May 16-20, 1994

Personnel: F. Howse, R. Kelly, F. Bahr, R. Little, L. Caporelli, A. Close, D. Nelson (OSU), M. Brzezinski (UCSB).

R/V Weatherbird II

16 May 1994

0700 - Depart BBSR.

1347 - Deploy PITs. Lat: 31.754 N; Long: 64.157 W

1403 - **CTD cast 1**, 500 m cast.
Lat: 31.754 N; Long: 64.152 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,150, 150, 150, 150, 150,150,150,150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

1521 - CTD cast 1 on deck. Lat: 31.763 N; Long: 64.138 W

1528 - BBOP cast. Lat: 31.762 N; Long: 64.137 W

1556 - **GoFlo cast #1** (Nelson/Brzezinski). Lat: 31.774 N; Long: 64.079 W

1642 - **CTD cast 2**, 4200 m cast.
Lat: 31.776 N; Long: 64.127 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 3000 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
bacteria (Giovannoni)	300 m

2055 - CTD cast 2 on deck. Lat: 31.796 N; Long: 64.080 W

2108 - BBOP cast. Lat: 31.798 N; Long: 64.079 W

2138 - **GoFlo cast #2** (Nelson/Brzezinski). Lat: 31.812 N; Long: 64.069 W

2330 - Deploy 12 hour Si incubation array. Lat: 31.831 N; Long: 64.079 W

17 May 1994

0107 - BBOP cast. Lat: 31.835 N; Long: 64.054 W

0222 - **GoFlo cast #3**, 160 m. (Nelson/Brzezinski). Lat: 31.841 N; Long: 64.027 W

0313 - **GoFlo cast #4**, 160 m. (Nelson/Brzezinski). Lat: 31.859 N; Long: 64.017 W

0356 - **GoFlo cast #5**, 140 m.
Lat: 31.873 N; Long:64.004 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0457 - Recover Si production array. Lat: 31.867 N; Long: 64.025 W

0600 - Deploy primary production array.
Lat: 64.881 N; Long: 64.009 W

0626 - BBOP cast. Lat: 31.868 N; Long: 64.000 W

0730 - BBOP cast. Lat: 31.861 N; Long: 64.009 W

0833 - BBOP cast. Lat: 31.892 N; Long: 63.993 W

0915 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.883 N; Long: 64.984 W

1007 - BBOP cast. Lat: 31.881 N; Long: 63.980 W

1027 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.884 N; Long: 64.977 W

1109 - BBOP cast. Lat: 31.883 N; Long: 63.970 W

1122 - Begin Wakeham pumping.

1145 - **CTD cast 3**, 500 m cast.
Lat: 31.892 N; Long: 63.963 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
dissolved I (Jickells)	12 depths
particulate I (Jickells)	top 11 depths
picoplankton (Olson)	12 depths

1250 - CTD cast 3 on deck. Lat: 31.912 N; Long: 63.950 W

1318 - BBOP cast. Lat: 31.992 N; Long: 63.937 W

1340 - End Wakeham pumping.

1441 - BBOP cast. Lat: 31.928 N; Long: 63.925 W

1607 - BBOP cast. Lat: 31.944 N; Long: 63.916 W

1637 - **CTD cast 4**, 500 m. Lat: 31.959 N; Long: 63.903 W
Calibration cast. No bottles fired.

1703 - CTD cast 4 on deck. Lat: 31.965 N; Long: 63.898 W

1705 - **CTD cast 5**, 500 m cast.
Lat: 31.967 N; Long: 63.896 W
Nominal depths: 1, 1, 1, 10, 20, 30, 40, 50, 60, 60, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 200, 200, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
dissolved I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m.
particulate I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, and 200 m.

1815 - CTD cast 5 on deck. Lat: 31.993 N; Long: 63.875 W

1841 - BBOP cast. Lat: 31.974 N; Long: 63.888 W

1939 - BBOP cast. Lat: 31.963 N; Long: 63.897 W

2024 - Recover primary production array.
Lat: 31.972 N; Long: 63.877 W

2053 - BBOP cast.

2124 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.975 N; Long: 64.878 W

2155 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.975 N; Long: 64.872 W

2256 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.975 N; Long: 63.835 W

2317 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.971 N; Long: 63.840 W

18 May 1994

0106 - BBOP cast. Lat: 31.969 N; Long: 63.962 W

0140 - **GoFlo cast #6**, 20m. (Nelson/Brzezinski). Lat: 31.993 N; Long: 63.819 W

0330 - Depart for Hydrostation S

0751 - **HS 766 CTD cast,** 2600 m.
Lat: 32.164 N; Long: 64.500 W

1111 - HS 766 CTD cast on deck. Lat: 32.155 N; Long: 64.446 W

1125 - BBOP cast. Lat: 32.155 N; Long: 64.446 W

1155 - Zooplankton tow (Ferrari), 0-800 m (335 μm net). Lat: 31.152 N; Long: 63.279 W

1257 - Zooplankton tow (Ferrari), 0-800 m (335 μm net). Lat: 31.154 N; Long: 64.384 W

1348 - Zooplankton tow (Ferrari), 0-800 m (335 μm net). Lat: 31.155 N; Long: 64.382 W

1455 - Depart for BBSR.

1815 - Arrive BBSR.

1938 - Depart BBSR.

Personnel: F. Howse, A. Close, L. Caporelli, M. Brzezinski, D. Nelson, R. Parsons

19 May 1994

0149 - Arrive at PITS.

0158 - **GoFlo cast #7**, 20m. (Nelson/Brzezinski). Lat: 32.100 N; Long: 63.634 W

0325 - **GoFlo cast #8**, 160m. (Nelson/Brzezinski). Lat: 32.101 N; Long: 63.607 W

0403 - BBOP cast. Lat: 32.101 N; Long: 63.608 W

0447 - Deploy 2 day Si production array.
Lat: 32.108 N; Long: 64.612 W

0734 - BBOP cast. Lat: 32.122 N; Long: 63.610 W

0807 - **CTD cast 6**, 500 m cast.
Lat: 32.123 N; Long: 63.603 W
Nominal depths: 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000 and 1000 m.

Samples taken:

Stramska deep water	1000 m
Trap sample water	10 m

0904 - CTD cast 6 on deck. Lat: 32.127 N; Long: 63.595 W

1131 - BBOP cast. Lat: 32.133 N; Long: 63.577 W

1235 - **CTD cast 7**, 500 m cast.
Lat: 32.149 N; Long: 63.587 W
Nominal depths: 1, 1, 1, 1, 10, 20, 20, 20, 40, 40, 60, 60, 60, 80, 80, 100, 100, 120, 140, 140, 160, 160, 250, 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
chl *a* (BBOP)	11 depths

1335 - CTD cast 7 on deck. Lat: 32.162 N; Long: 63.587W

1349 - BBOP cast. Lat: 32.164 N; Long: 63.585 W

1709 - BBOP cast. Lat: 32.204 N; Long: 63.573 W

1901 - BBOP cast. Lat: 32.202 N; Long: 63.541 W

1958 - Recover Si production array. Lat: 32.201 N; Long: 64.527 W

2030 - Redeploy Si production array. Lat: 32.211 N; Long: 64.524 W

2200 - BBOP cast. Lat: 32.202 N; Long: 63.510 W

2230 - **GoFlo cast #9**, 160m. (Nelson/Brzezinski). Lat: 32.219 N; Long: 63.518 W

20 May 1994

0049 - BBOP cast. Lat: 32.238 N; Long: 63.500 W

0138 - **CTD cast 8**, 500 m cast.
Lat: 32.244 N; Long: 63.495 W
Nominal depths: 1, 1, 1, 1, 1, 20, 20, 20, 20, 20, 60, 60, 150, 150, 200, 200, 200, 200, 200, 200, 200, 200, 200, 200 m.

Samples taken:

total thorium (Buesseler)	16 depths

0256 - CTD cast 8 on deck. Lat: 32.261 N; Long: 63.484 W

0403 - BBOP cast. Lat: 32.237 N; Long: 63.469 W

0425 - Recover Si production array. Lat: 31.258 N; Long: 63.456 W

0509 - Recover PITs. Lat: 32.253 N; Long: 63.457 W

0520 - Depart for Hydrostation S

1130 - Arrive at Hydrostation S

1227 - **CTD cast 9**, 250 m cast.
Lat: 32.181 N; Long: 64.871 W
Nominal depths: 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 15, 20, 30, 40, 60, 80, 100, 120, 140, 140, 140, 140, 140m.

Samples taken:

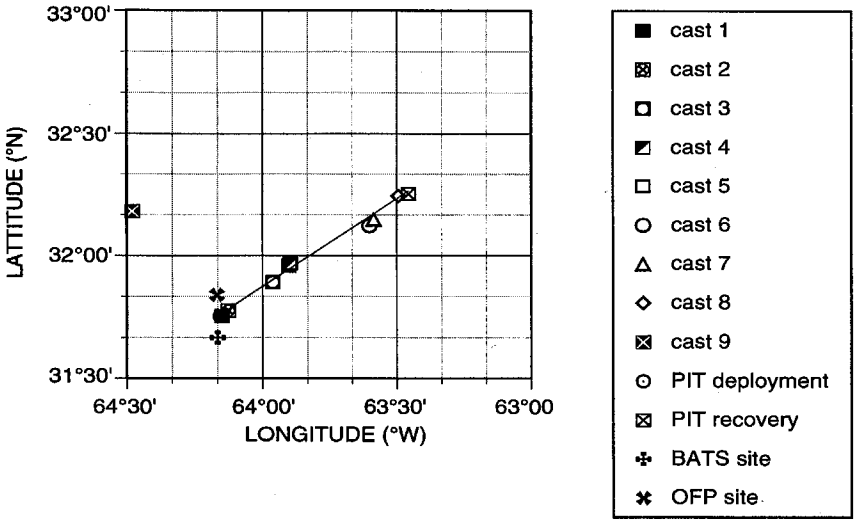
DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

1327 - CTD cast 9 on deck. Lat: 32.187 N; Long: 64.466 W

1330 - Depart for BBSR.

1615 - Arrive BBSR

Cast positions: BATS 68

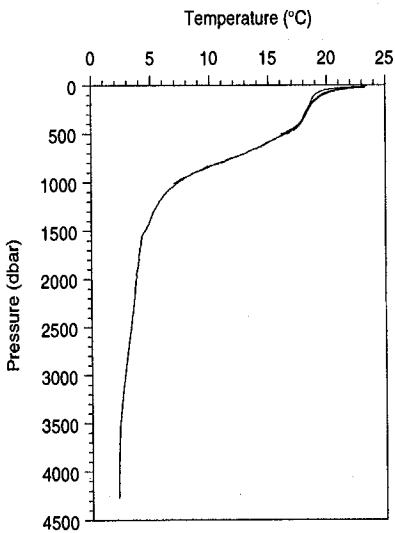


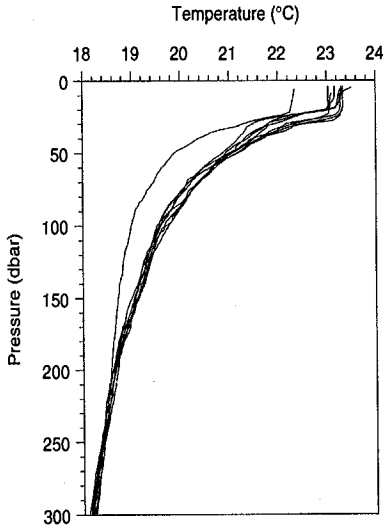
BATS 68, CTD Cast 2
May 16, 1994
Start cast: time: 1642 lat: 31.776 N long: 64.127 W
End cast: time: 2055 lat: 31.796 N long: 64.080 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	$Sigma_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
5.0	5.0	23.505	23.504	36.581	24.987	214.28	9.92	0.455	
10.0	10.1	23.275	23.273	36.578	25.053	214.68	9.53	0.455	
20.0	20.1	22.966	22.962	36.669	25.213	215.60	9.51	0.454	
30.0	30.2	21.806	21.800	36.705	25.572	220.08	9.90	0.453	
40.0	40.3	21.375	21.367	36.704	25.692	221.73	9.97	0.458	
50.0	50.4	20.928	20.919	36.684	25.800	222.36	8.91	0.461	
60.0	60.4	20.668	20.656	36.672	25.863	222.10	7.64	0.463	
70.0	70.5	20.391	20.378	36.652	25.923	222.10	6.55	0.464	
80.0	80.6	20.156	20.141	36.638	25.976	221.30	4.83	0.466	
90.0	90.6	19.957	19.940	36.623	26.017	220.48	3.22	0.461	
100.0	100.7	19.753	19.734	36.617	26.067	218.41	0.34	0.458	
110.0	110.8	19.591	19.570	36.607	26.103	217.36	-1.37	0.456	
120.0	120.9	19.409	19.387	36.593	26.140	215.87	-3.60	0.463	
130.0	131.0	19.335	19.311	36.599	26.165	212.61	-7.14	0.447	
140.0	141.0	19.237	19.211	36.598	26.190	210.39	-9.75	0.435	
150.0	151.1	19.131	19.104	36.601	26.220	206.27	-14.29	0.428	
160.0	161.2	19.017	18.988	36.597	26.247	205.00	-16.03	0.421	
170.0	171.3	18.879	18.848	36.593	26.279	202.83	-18.76	0.417	
180.0	181.3	18.790	18.758	36.591	26.301	202.98	-18.97	0.415	
190.0	191.4	18.697	18.662	36.587	26.322	203.21	-19.13	0.412	
200.0	201.5	18.609	18.574	36.582	26.341	202.07	-20.64	0.410	
210.0	211.6	18.530	18.492	36.576	26.358	202.27	-20.77	0.409	
220.0	221.7	18.471	18.431	36.574	26.371	201.91	-21.38	0.408	
230.0	231.7	18.445	18.404	36.573	26.377	201.61	-21.78	0.407	
240.0	241.8	18.419	18.376	36.569	26.381	201.59	-21.91	0.406	
250.0	251.9	18.357	18.313	36.564	26.393	201.55	-22.22	0.406	
275.0	277.1	18.212	18.163	36.548	26.418	201.70	-22.69	0.406	
300.0	302.3	18.097	18.045	36.533	26.437	202.37	-22.52	0.404	
325.0	327.5	18.027	17.970	36.524	26.448	202.50	-22.70	0.403	
350.0	352.7	17.948	17.887	36.513	26.461	202.09	-23.46	0.402	
375.0	378.0	17.824	17.759	36.492	26.476	200.27	-25.84	0.401	
400.0	403.2	17.643	17.574	36.459	26.496	197.12	-29.81	0.400	
425.0	428.4	17.390	17.317	36.413	26.523	193.34	-34.74	0.400	
450.0	453.6	17.104	17.028	36.361	26.554	189.51	-39.89	0.400	
475.0	478.9	16.837	16.757	36.314	26.582	187.41	-43.23	0.399	
500.0	504.1	16.489	16.406	36.253	26.619	184.08	-48.21	0.399	
550.0	554.6	15.658	15.570	36.110	26.701	177.13	-59.15	0.398	
600.0	605.1	14.871	14.778	35.987	26.783	173.04	-67.13	0.395	
650.0	655.6	13.906	13.810	35.838	26.876	173.47	-71.62	0.393	
700.0	706.1	13.033	12.933	35.711	26.958	167.93	-81.77	0.392	
750.0	756.6	11.809	11.708	35.541	27.065	162.60	-93.82	0.391	
800.0	807.2	10.686	10.585	35.396	27.160	153.13	-109.74	0.390	
850.0	857.7	9.740	9.638	35.301	27.249	152.26	-116.22	0.389	
900.0	908.3	8.569	8.469	35.188	27.350	156.58	-119.15	0.388	
950.0	958.9	7.849	7.748	35.144	27.425	165.97	-114.34	0.387	
1000.0	1009.4	7.261	7.159	35.124	27.495	174.93	-109.19	0.386	
1050.0	1060.0	6.759	6.655	35.120	27.561	188.39	-99.04	0.385	
1100.0	1110.7	6.317	6.212	35.119	27.620	201.70	-88.68	0.384	
1150.0	1161.3	5.990	5.882	35.115	27.659	210.07	-82.54	0.383	
1200.0	1211.9	5.697	5.587	35.105	27.688	217.70	-76.96	0.381	
1300.0	1313.2	5.201	5.085	35.083	27.731	230.54	-67.65	0.378	

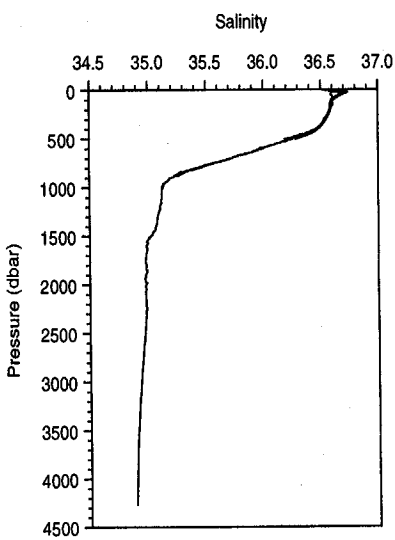
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.897	4.775	35.066	27.754	238.43	-61.97	0.376	
1500.0	1516.0	4.419	4.293	35.010	27.763	247.83	-56.19	0.375	
1600.0	1617.4	4.176	4.043	34.987	27.772	254.10	-51.77	0.374	
1700.0	1718.9	4.053	3.912	34.982	27.781	256.72	-50.08	0.372	
1800.0	1820.5	3.981	3.831	34.986	27.792	257.63	-49.69	0.371	
1900.0	1922.1	3.838	3.681	34.977	27.801	259.37	-49.05	0.370	
2000.0	2023.7	3.754	3.587	34.982	27.814	259.70	-49.35	0.370	
2100.0	2125.4	3.673	3.498	34.981	27.822	259.76	-49.90	0.369	
2200.0	2227.2	3.604	3.421	34.984	27.832	259.45	-50.73	0.368	
2300.0	2328.9	3.516	3.324	34.982	27.840	259.21	-51.64	0.367	
2400.0	2430.8	3.400	3.200	34.975	27.847	259.67	-52.09	0.367	
2500.0	2532.7	3.298	3.089	34.969	27.852	260.31	-52.25	0.367	
2600.0	2634.6	3.172	2.956	34.960	27.858	261.00	-52.56	0.367	
2700.0	2736.6	3.061	2.836	34.952	27.862	261.74	-52.71	0.367	
2800.0	2838.6	2.968	2.734	34.946	27.866	262.90	-52.29	0.367	
2900.0	2940.7	2.859	2.617	34.939	27.871	263.89	-52.18	0.366	
3000.0	3042.8	2.762	2.512	34.933	27.876	264.68	-52.17	0.366	
3100.0	3144.9	2.650	2.392	34.927	27.881	265.32	-52.43	0.366	
3200.0	3247.2	2.568	2.301	34.922	27.884	265.70	-52.72	0.364	
3300.0	3349.4	2.481	2.205	34.916	27.888	266.03	-53.11	0.364	
3400.0	3451.7	2.397	2.112	34.911	27.891	266.17	-53.65	0.365	
3500.0	3554.1	2.327	2.033	34.905	27.893	265.91	-54.49	0.366	
3600.0	3656.5	2.294	1.990	34.902	27.894	265.65	-55.03	0.366	
3700.0	3758.9	2.269	1.954	34.900	27.895	264.88	-56.01	0.367	
3800.0	3861.4	2.247	1.921	34.897	27.896	264.03	-57.04	0.367	
3900.0	3964.0	2.230	1.893	34.895	27.896	263.36	-57.86	0.369	
4000.0	4066.5	2.213	1.866	34.892	27.896	262.07	-59.28	0.372	
4100.0	4169.2	2.208	1.849	34.890	27.896	261.20	-60.20	0.374	
4200.0	4272.0	2.213	1.841	34.889	27.895	260.08	-61.29	0.376	

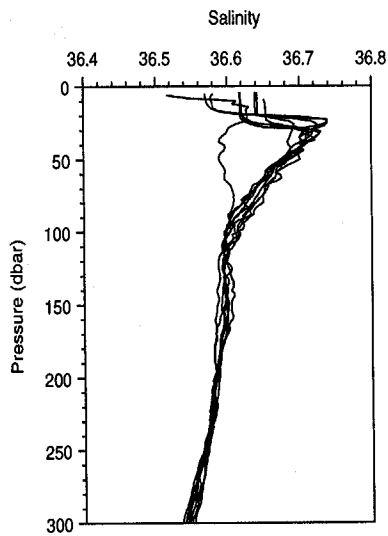
BATS 68—CTD Temperature Profiles



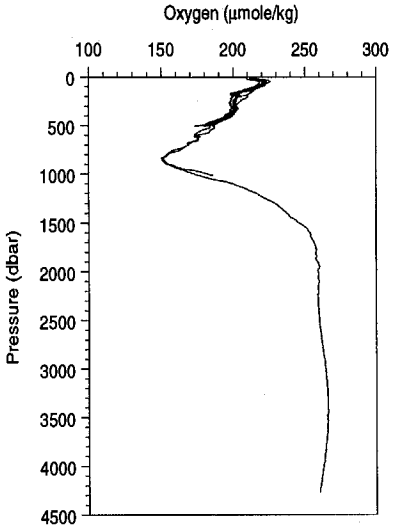


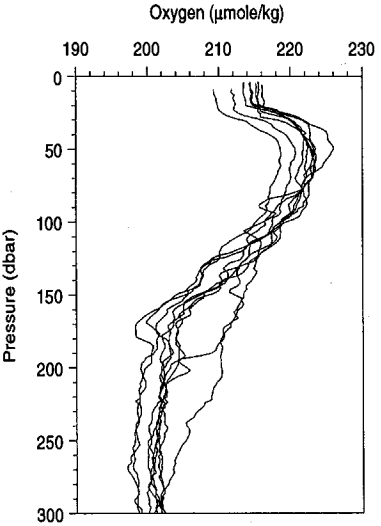
BATS 68—CTD Salinity Profiles



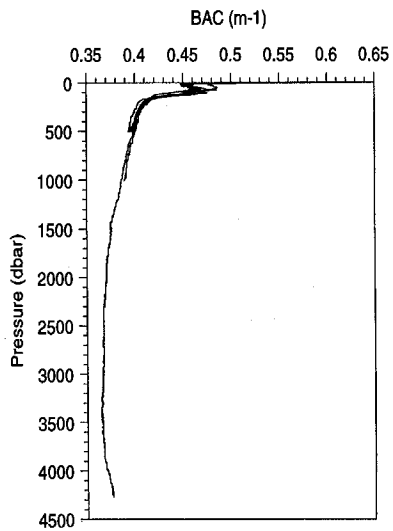


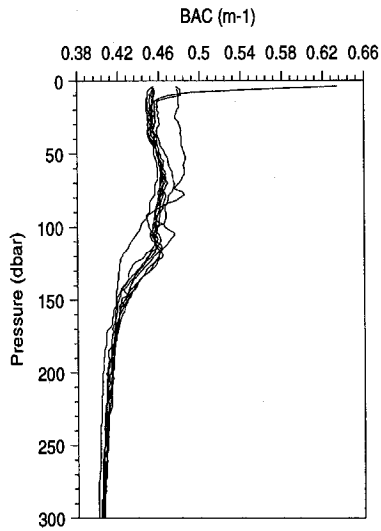
BATS 68—CTD Oxygen Profiles



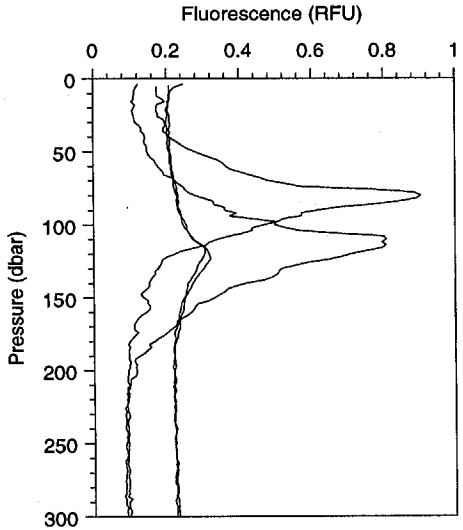


BATS 68—CTD BAC Profiles

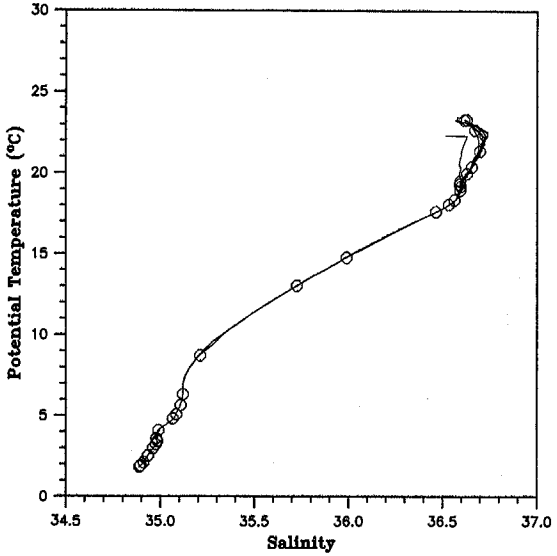




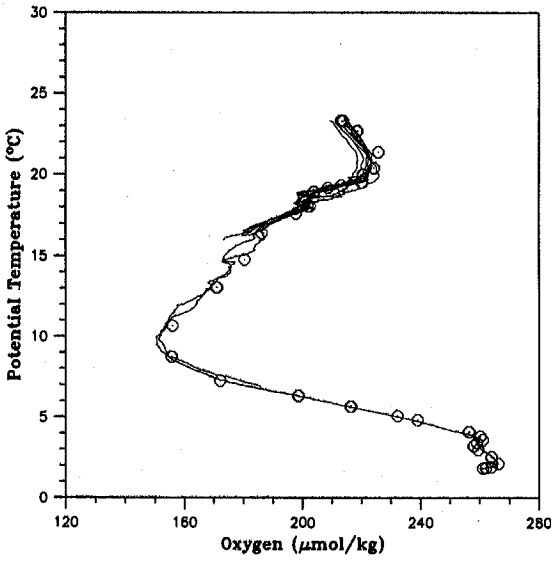
BATS 68—CTD Fluorescence Profile



BATS 68—T-S Diagram



BATS 68—T-O Diagram



BATS 68—Bottle Data
May 16-20, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	Sigma$_\theta$ (kg/m^3)
10680301	2.9	2.9	23.315	36.617	23.314	36.627	25.078
10680302	3.3	3.3	23.313	36.617	23.312		25.071
10680303	11.9	12.0	23.293	36.616	23.291	36.616	25.077
10680304	12.1	12.2	23.285	36.616	23.282		25.079
10680306	21.4	21.5	22.700	36.668	22.695		25.289
10680305	21.5	21.6	22.680	36.670	22.675	36.672	25.298
10680308	40.8	41.1	21.373	36.696	21.365		25.687
10680307	40.8	41.1	21.379	36.698	21.371	36.698	25.686
10680309	61.7	62.1	20.410	36.655	20.399	36.655	25.920
10680310	61.7	62.1	20.411	36.655	20.400		25.919
10680312	79.9	80.5	20.003	36.630	19.988		26.011
10680311	80.0	80.6	20.004	36.631	19.989	36.630	26.010
10680314	100.0	100.7	19.550	36.596	19.531		26.104
10680313	100.2	100.9	19.547	36.596	19.529	36.594	26.104
10680316	120.3	121.1	19.363	36.591	19.341		26.151
10680315	120.6	121.5	19.363	36.591	19.341	36.591	26.151
10680317	140.4	141.4	19.219	36.595	19.194	36.597	26.194
10680318	140.5	141.5	19.219	36.595	19.193		26.192
10680319	160.4	161.6	18.976	36.595	18.947	36.594	26.255
10680320	161.0	162.2	18.974	36.595	18.945		26.256
10680322	199.7	201.1	18.669	36.582	18.633		26.326
10680321	200.4	201.9	18.665	36.582	18.629		26.327
10680324	250.9	252.8	18.395	36.564	18.351		26.384
10680323	251.0	252.9	18.394	36.564	18.349	36.563	26.383
10680201	302.7	305.0	18.126	36.534	18.072	36.534	26.430
10680202	402.5	405.8	17.688	36.465	17.618	36.465	26.490
10680203	500.9	505.0	16.505	36.255	16.422		26.616
10680204	601.0	606.1	14.876	35.990	14.782	35.990	26.784
10680205	698.9	705.0	13.134	35.723	13.034	35.725	26.948
10680206	802.9	810.1	10.754	35.406	10.653		27.155
10680207	901.5	909.8	8.823	35.212	8.721	35.212	27.329
10680208	999.6	1009.0	7.351	35.127	7.248		27.484
10680209	1104.2	1114.9	6.430	35.120	6.324	35.120	27.606
10680210	1197.7	1209.5	5.766	35.107	5.655	35.109	27.683
10680211	1328.3	1341.9	5.190	35.084	5.072	35.085	27.735
10680212	1394.3	1408.7	4.944	35.066	4.822	35.066	27.749
10680213	1586.9	1604.1	4.227	34.989	4.094	34.990	27.769
10680214	1807.6	1828.2	3.964	34.981	3.813		27.791
10680215	2000.0	2023.7	3.766	34.979	3.600	34.979	27.810
10680216	2196.7	2223.8	3.610	34.982	3.426	34.985	27.832
10680217	2395.7	2426.4	3.429	34.977	3.229	34.976	27.845
10680218	2592.5	2626.9	3.195	34.962	2.979	34.961	27.856
10680219	2999.2	3042.0	2.780	34.934	2.530	34.936	27.876
10680220	3000.5	3043.3	2.779	34.935	2.529	34.934	27.875
10680221	3404.2	3456.0	2.404	34.911	2.119	34.912	27.891
10680222	3800.8	3862.2	2.245	34.897	1.920	34.896	27.894
10680223	3998.8	4065.3	2.214	34.892	1.866	34.891	27.895
10680224	4196.8	4268.5	2.213	34.889	1.842	34.888	27.895

BATS 68—Bottle Data
May 16-20, 1994
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10680301	2.9	213.01	213.79	8.05	8.84	2044
10680303	11.9	213.40	213.88	8.37	8.85	2044
10680305	21.5	218.46	218.76	11.36	11.67	2046
10680307	40.8	225.70	225.83	13.94	14.08	2048
10680309	61.7	224.22	224.30	8.75	8.84	2052
10680311	80.0	220.55	220.42	3.48	3.35	2060
10680313	100.2	220.32	220.01	1.40	1.10	2068
10680315	120.6	213.17	213.30	-6.48	-6.35	2068
10680317	140.4	208.74	208.69	-11.48	-11.52	
10680319	160.4	204.02	203.85	-17.17	-17.35	2081
10680321	200.4	200.74	200.48	-21.74	-22.00	2086
10680323	251.0	200.95	200.69	-22.67	-22.93	2089
10680201	302.7	201.95	202.60	-22.83	-22.18	
10680202	402.5	197.84	197.80	-28.89	-28.93	
10680203	500.9	186.21	186.30	-46.00	-45.91	
10680204	601.0	180.41	180.41	-59.73	-59.73	
10680205	698.9	171.18	170.83	-77.98	-78.33	
10680206	802.9	155.99	155.95	-106.48	-106.52	
10680207	901.5	155.75	155.62	-118.38	-118.51	
10680208	999.6	172.06	172.15	-111.47	-111.39	
10680209	1104.2	198.74	198.47	-90.88	-91.14	
10680210	1197.7	216.57	216.26	-77.61	-77.92	
10680211	1328.3	232.22	232.22	-66.05	-66.05	
10680212	1394.3	239.01	238.97	-61.05	-61.10	
10680213	1586.9	256.59	256.25	-48.89	-49.24	
10680214	1807.6	260.17	260.30	-47.30	-47.16	
10680215	2000.0	261.07	260.98	-47.89	-47.98	
10680216	2196.7	259.12	259.03	-51.02	-51.11	
10680217	2395.7	258.12	257.85	-53.42	-53.68	
10680218	2592.5	259.55	259.38	-53.83	-54.00	
10680219	2999.2	263.90	263.99	-52.80	-52.71	
10680220	3000.5	263.97	264.10	-52.75	-52.61	
10680221	3404.2	266.33	266.33	-53.44	-53.44	
10680222	3800.8	263.98	263.98	-57.11	-57.11	
10680223	3998.8	262.18	262.05	-59.18	-59.31	
10680224	4196.8	261.04	261.12	-60.33	-60.24	

BATS 68—Bottle Data
May 16-20, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10680301	2.9	0.00	0.00	0.00	0.9
10680303	11.9	0.00	0.00	0.00	0.9
10680305	21.5	0.00	0.00	0.00	0.9
10680307	40.8	0.00	0.00	0.00	0.9
10680309	61.7	0.00	0.00	0.00	0.9
10680311	80.0	0.00	0.00	0.00	0.9
10680313	100.2	0.00	0.00	0.00	1.0
10680315	120.6	0.47	0.07	0.00	1.1
10680317	140.4	0.92	0.04	0.00	1.3
10680319	160.4	1.66	0.00	0.07	1.2
10680321	200.4	2.59	0.00	0.13	1.4
10680323	251.0	3.34	0.00	0.19	1.5
10680201	302.7	3.80	0.00	0.21	1.8
10680202	402.5	5.01	0.00	0.29	2.3
10680203	500.9	7.93	0.00	0.54	3.2
10680204	601.0	11.03	0.00	0.65	4.8
10680205	698.9	14.30	0.00	0.89	7.3
10680206	802.9	20.16	0.00	1.30	11.5
10680207	901.5	22.74	0.00	1.54	14.8
10680208	999.6	22.96	0.00	1.57	16.1
10680209	1104.2	21.09	0.00	1.46	15.1
10680210	1197.7	20.10	0.00	1.39	14.6
10680211	1328.3	19.43	0.00	1.34	14.2
10680212	1394.3	18.45	0.00	1.28	14.0
10680213	1586.9	17.78	0.00	1.23	13.3
10680214	1807.6	17.98	0.00	1.26	14.1
10680215	2000.0	17.98	0.00	1.26	15.6
10680216	2196.7	18.19	0.00	1.28	17.7
10680217	2395.7	17.93	0.00	1.29	20.0
10680218	2592.5	18.45	0.00	1.31	21.8
10680219	2999.2	17.93	0.00	1.28	23.6
10680220	3000.5	18.14	0.00	1.33	23.6
10680221	3404.2	18.09	0.00	1.31	27.5
10680222	3800.8		0.00	1.32	32.5
10680223	3998.8	19.02	0.00	1.38	35.1
10680224	4196.8	18.45	0.00	1.37	36.6

BATS 68—Bottle Data
May 16-20, 1994
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10680302	3.3	19.11	2.28	5.23	0.049	0.000
10680304	12.1	31.01	3.96	4.27	0.049	0.000
10680306	21.4	29.69	4.10	5.45	0.068	0.000
10680308	40.8	35.22	4.56	5.97	0.058	0.000
10680310	61.7	32.40	4.77	6.69	0.127	0.000
10680312	79.9	31.35	4.56	6.09	0.195	0.000
10680314	100.0	40.24	7.44	6.27	0.283	0.068
10680316	120.3	27.94	4.56	6.03	0.244	0.117
10680318	140.5	21.08	3.15	4.47	0.312	0.000
10680320	161.0	16.03	1.94	2.32	0.049	0.049
10680322	199.7	11.59	1.47	2.01	0.019	0.000
10680324	250.9	21.08	1.94	1.95	0.000	0.000
10680201	302.7	12.99	1.07	1.07		
10680202	402.5	9.97	1.14	1.04		
10680203	500.9	10.92	1.14			
10680204	601.0	11.52	0.80			
10680205	698.9	9.65	1.68			
10680206	802.9	2.07				
10680207	901.5	6.94				
10680209	1104.2			0.49		
10680212	1394.3			0.22		
10680219	2999.2			0.11		
10680223	3998.8			0.31		

BATS 68—Bottle Data
May 16-20, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10680302	3.3	0	2	5	12	4	0	30	0
10680304	12.1	0	3	5	9	4	0	25	0
10680306	21.4	0	3	5	11	6	0	29	0
10680308	40.8	0	4	5	13	12	0	39	0
10680310	61.7	4	9	5	27	26	12	85	0
10680312	79.9	8	15	5	37	34	15	129	6
10680314	100.0	12	22	5	66	57	72	271	23
10680316	120.3	17	50	5	58	24	140	271	22
10680318	140.5	9	36	5	44	9	100	176	17
10680320	161.0	5	13	5	25	1	31	64	3
10680322	199.7	0	3	5	8	0	0	8	0
10680324	250.9	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10680302	3.3	0	0	0	0	7	0	0
10680304	12.1	0	0	0	0	6	0	0
10680306	21.4	0	0	0	0	6	0	0
10680308	40.8	0	0	0	0	5	0	0
10680310	61.7	3	0	0	0	4	0	0
10680312	79.9	3	0	0	0	5	0	0
10680314	100.0	5	0	0	0	4	0	0
10680316	120.3	10	0	0	0	4	0	0
10680318	140.5	7	0	0	0	2	0	0
10680320	161.0	4	0	0	0	2	0	0
10680322	199.7	0	0	0	0	0	0	0
10680324	250.9	0	0	0	0	0	0	0

BATS 68: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	3.93	4.54	3.21	0.30	0.97	0.96	0.92	1.00
20	3.07	2.89	3.75	0.42	0.47	0.76	0.75	0.81
40	4.00	3.22	3.09	0.38	0.54	1.14	1.17	1.00
60	3.20	3.37	3.63	0.35	0.89	1.19	1.02	0.99
80	2.96	3.25	3.51	0.44	0.41	1.26	1.30	1.58
100	2.80	2.65	2.54	0.33	0.53	1.19	1.12	1.37
120	0.40	0.39	0.49	0.37	0.41	1.34	1.43	1.26
140	0.71	0.62	0.84	0.52	0.60	0.28	0.27	0.24

BATS 68: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	352	73.76	28.32	4.38
150	353	118.72	23.36	3.30
150	354	110.29	13.90	2.37
200	355	70.25	25.75	4.67
200	356	66.03	24.57	3.54
200	357	60.41	13.17	2.16
300	358	43.55	14.74	2.78
300	359	42.15	18.02	4.42
300	360	63.93	22.09	5.20

BATS 69

Cruise Report

Cruise dates: June 13-17, 1994

Personnel: K. Gundersen, R. Johnson, A. Close, F. Howse, A. Doyle, S. Neuer, R. Pratt, C. Brush, L. McDowell.

R/V Weatherbird II

13 June 1994

0715 - Depart BBSR.

1403 - Deploy PITs. Lat: 31.759 N; Long: 64.165 W

1413- **CTD cast 1**, 500 m cast. (Buesseler)
Lat: 31.767 N; Long: 64.152 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 180, replicates at 200 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 m.

1533 - CTD cast 1 on deck. Lat: 31.757 N; Long: 64.138 W

1611 - BBOP cast. Lat: 31.767 N; Long: 64.152 W

1657 - **CTD cast 2**, 4200 m cast.
Lat: 31.748 N; Long: 65.161 W
Cast drifted too close to Altomoor - aborted

1742 - **CTD cast 3**, 4200 m cast.
Lat: 31.717 N; Long: 64.125 W
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 1400, 2000, 2600, 3400 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000 and 3400 m.

2111 - CTD cast 3 on deck. Lat: 31.697 N; Long: 34.021 W

2156 - BBOP cast. Lat: 31.747 N; Long: 64.099 W

2250 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.753 N; Long: 64.093 W

2333 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.742 N; Long: 64.091 W

14 June1994

0006 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.735 N; Long: 64.091 W

0034 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.733 N; Long: 64.099 W

0055 - Zooplankton tow (Taylor), 0-100 m (20 μm net). Lat: 31.727 N; Long: 64.098 W

0207 - BBOP cast. Lat: 31.724 N; Long: 64.115 W

0405 - **GoFlo cast #2**, 140 m.
Lat: 31.521 N; Long: 64.050 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths
chl *a* (BBOP)	8 depths

0525 - Deploy primary production array.
Lat: 31.736 N; Long: 64.024 W

0557 - BBOP cast. Lat: 31.732 N; Long: 64.039 W

0714 - BBOP cast. Lat: 31.732 N; Long: 64.039 W

0807 - **CTD cast 4**, 500 m cast.
Lat: 31.731 N; Long: 64.022 W
Nominal depths: 1, 1, 10, 10, 20, 30, 30, 30,30,30,40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160 m.

Samples taken:

acantharia (Michaels)	1, 10, 20, 40, 60, 80, 100, 120, 140, and 160 m.

0909 - CTD cast 2 on deck. Lat: 31.733 N; Long: 64.021 W

0950 - BBOP cast. Lat: 31.733 N; Long: 64.008 W

1034 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.738 N; Long: 64.000 W

1108 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.744 N; Long: 63.999W

1131 - Begin Wakeham pumping.

1145 - Stop Wakeham pumping. Flowmeter detached.

1200 - BBOP cast. Lat: 31.751 N; Long: 63.993 W

1219 - BBOP cast. Lat: 31.758 N; Long: 63.992 W

1226 - Restart Wakeham pumping

1308 - **CTD cast 5**, 500 m cast.
Lat: 31.760 N; Long: 63.984 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths
DIC	1, 10, 20, 40, 60, 80, 100, 120, 140, 200 and 250; replicates at 1, 40 and 250 m

DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths
DOM (Nelson)	12 depths
chl *a* (BBOP)	12 depths

1417 - CTD cast 5 on deck. Lat: 31.764 N; Long: 63.975 W

1428 - End Wakeham pumping.

1455 - BBOP cast. Lat: 31.736 N; Long: 63.999 W

1518 - BBOP cast. Lat: 31.735 N; Long: 63.988 W

1648 - **CTD cast 6**, 500 m. Lat: 31.728 N; Long: 63.976 W
Calibration cast. No bottles fired.

1710 - CTD cast 6 on deck. Lat: 31.727 N; Long: 63.970 W

1741- **CTD cast 7**, 500 m cast.
Lat: 31.727 N; Long: 63.970 W
Nominal depths: 1, 1, 10, 20, 30, 40, 50, 60, 60, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 200, 200, 250, 500 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
dissolved I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m.
particulate I (Jickells)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, and 200 m.

1840 - CTD cast 7 on deck. Lat: 31.728 N; Long: 63.951 W

1858 - BBOP cast. Lat: 31.738 N; Long: 63.951 W

2017 - BBOP cast. Lat: 31.744 N; Long: 63.930 W

2121 - Recover primary production array.
Lat: 31.710 N; Long: 63.918 W

2145 - Depart for Station S.

15 June1994

0159 - **HS 768 CTD cast,** 2600 m. Lat: 32.171 N; Long: 64.508 W
Cast aborted due to rosette malfunction.

0245 - **HS 768 CTD cast,** 2600 m. Lat: 32.168 N; Long: 64.506 W

0348 - HS CTD cast re-booted due to rosette malfunction.

0552 - HS CTD cast on deck. Lat: 32.174 N; Long: 64.517 W

0618 - Depart for BBSR.

0852 - Arrive at BBSR.

16 June 1994

0006 - Depart BBSR.

0900 - Plankton tow (Elardo), surface (330 μm net).

1006 - **CTD cast 8**, 500 m cast.
Lat: 31.720 N; Long: 63.738 W
Nominal depths: 1, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 180, 180, 200, 200, 250, 250 m.

Samples taken:

Elzone (BBOP)	1, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 140, 160, 180, and 200m.
chl *a* (BBOP)	1, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 140, 160, 180, and 200m.
EPA (Gundersen)	1, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 and 250 m.
^{3}H-Leucine (Gundersen)	1, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200 and 250 m.

1022 - CTD cast 8 on deck. Lat: 31.724 N; Long: 63.724 W

1155 - BBOP cast. Lat: 31.711 N; Long: 63.717 W

1243 - Plankton tow (Elardo), surface (330 μm net).

1401 - BBOP cast. Lat: 31.694 N; Long: 63.901 W

1535 - **CTD cast 9**, 500 m cast. (Buesseler)
Lat: 31.674 N; Long: 63.699 W
Nominal depths: 1, replicates at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

1647 - CTD cast 9 on deck. Lat: 31.668 N; Long: 63.693 W

1655 - Plankton tow (Elardo), surface (330 μm net).

1720 - Recover PITs. Lat: 31.664 N; Long: 63.700 W

1750 - Depart for Hydrostation S.

2307 - **CTD cast 10**, 250 m cast.
Lat: 32.164 N; Long: 64.488 W
Nominal depths: 1, 5, 10, 15, 20, 30, 40, 60, 80, 100, 120, 140 m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths
chl *a* (BBOP)	12 depths

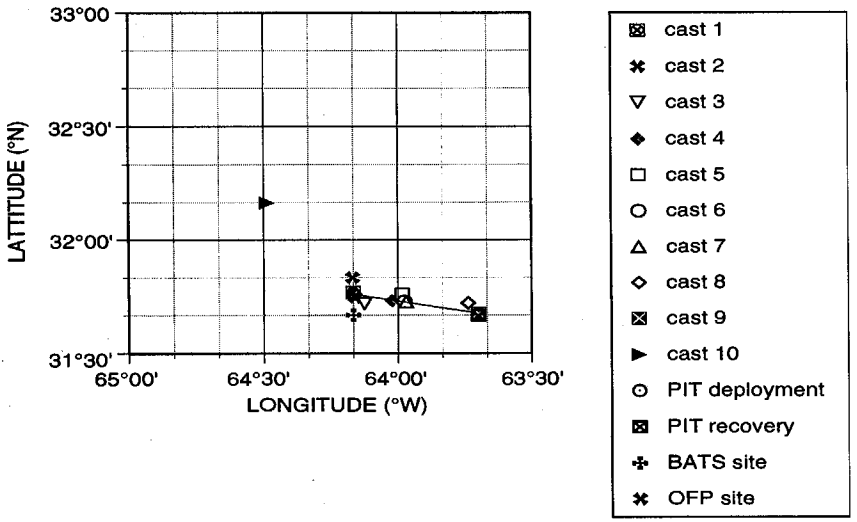
17 June 1994

0014 - CTD cast 10 on deck. Lat: 32.158 N; Long: 64.481 W

0015 - Depart for BBSR.

0245 - Arrive BBSR.

Cast positions: BATS 69

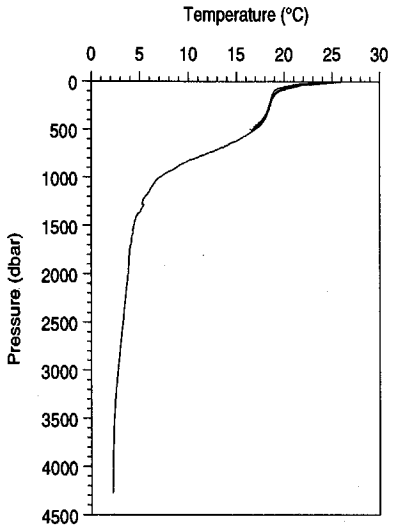


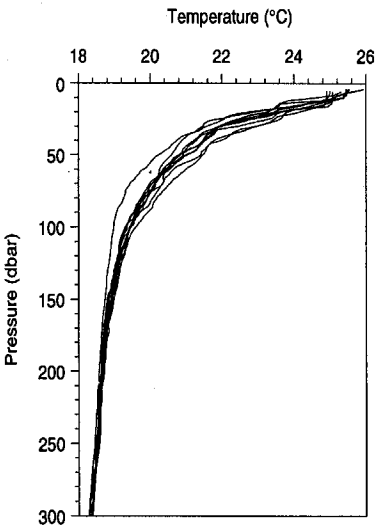
BATS 69, CTD Cast 3
June 13, 1994
Start cast: time: 1742 lat: 31.717 N long: 64.125 W
End cast: time: 2111 lat: 31.697 N long: 64.117W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
4.0	4.0	25.921	25.920	36.342	24.073	210.71	14.00	0.475	
10.0	10.1	25.088	25.086	36.322	24.316	212.69	13.27	0.474	
20.0	20.1	23.795	23.791	36.563	24.889	216.76	13.37	0.465	
30.0	30.2	22.902	22.896	36.621	25.196	219.66	13.27	0.465	
40.0	40.3	21.928	21.920	36.704	25.537	221.81	12.08	0.466	
50.0	50.4	21.401	21.391	36.704	25.685	224.01	12.34	0.471	
60.0	60.4	20.643	20.631	36.661	25.861	225.59	11.02	0.472	
70.0	70.5	20.327	20.314	36.650	25.939	224.87	9.07	0.471	
80.0	80.6	20.056	20.041	36.641	26.005	222.74	5.89	0.466	
90.0	90.6	19.698	19.681	36.625	26.087	220.26	1.99	0.487	
100.0	100.7	19.434	19.416	36.603	26.140	220.53	1.18	0.462	
110.0	110.8	19.341	19.321	36.603	26.165	218.83	-0.89	0.464	
120.0	120.9	19.223	19.201	36.614	26.204	212.53	-7.64	0.457	
130.0	131.0	18.995	18.972	36.586	26.243	216.60	-4.53	0.447	
140.0	141.0	18.948	18.922	36.586	26.255	215.41	-5.91	0.440	
150.0	151.1	18.903	18.876	36.590	26.270	214.03	-7.46	0.435	
160.0	161.2	18.848	18.819	36.587	26.283	213.72	-8.01	0.430	
170.0	171.3	18.800	18.770	36.582	26.291	213.45	-8.48	0.430	
180.0	181.3	18.780	18.748	36.589	26.302	213.42	-8.58	0.428	
190.0	191.4	18.743	18.709	36.588	26.311	212.43	-9.72	0.425	
200.0	201.5	18.708	18.672	36.585	26.318	211.75	-10.55	0.424	
210.0	211.6	18.650	18.613	36.579	26.329	211.71	-10.83	0.421	
220.0	221.7	18.632	18.592	36.584	26.338	211.13	-11.48	0.421	
230.0	231.7	18.595	18.554	36.578	26.343	210.26	-12.51	0.421	
240.0	241.8	18.601	18.558	36.593	26.354	206.21	-16.51	0.421	
250.0	251.9	18.567	18.523	36.591	26.361	205.26	-17.60	0.420	
275.0	277.1	18.450	18.401	36.574	26.379	207.06	-16.30	0.418	
300.0	302.3	18.369	18.316	36.566	26.394	204.71	-19.00	0.416	
325.0	327.5	18.261	18.203	36.552	26.412	200.98	-23.20	0.414	
350.0	352.7	18.173	18.111	36.543	26.428	200.56	-24.00	0.413	
375.0	378.0	18.077	18.011	36.533	26.445	200.85	-24.13	0.411	
400.0	403.2	17.921	17.851	36.505	26.463	196.76	-28.92	0.411	
425.0	428.4	17.753	17.679	36.475	26.483	192.77	-33.67	0.409	
450.0	453.6	17.526	17.448	36.435	26.509	190.60	-36.87	0.408	
475.0	478.9	17.223	17.142	36.380	26.541	186.86	-42.00	0.406	
500.0	504.1	16.920	16.835	36.327	26.574	183.56	-46.71	0.405	
550.0	554.6	16.153	16.063	36.197	26.655	180.29	-53.60	0.402	
600.0	605.1	15.295	15.200	36.057	26.743	176.60	-61.45	0.399	
650.0	655.6	14.191	14.093	35.871	26.842	167.64	-75.99	0.399	
700.0	706.1	13.138	13.038	35.714	26.939	159.34	-89.82	0.396	
750.0	756.6	11.858	11.757	35.527	27.046	151.65	-104.54	0.396	
800.0	807.2	10.605	10.504	35.369	27.152	148.47	-114.91	0.394	
850.0	857.7	9.458	9.358	35.243	27.251	150.05	-120.21	0.393	
900.0	908.3	8.632	8.532	35.178	27.332	157.77	-117.59	0.392	
950.0	958.9	7.686	7.586	35.138	27.444	172.73	-108.62	0.390	
1000.0	1009.4	6.949	6.849	35.108	27.525	187.44	-98.76	0.387	
1050.0	1060.0	6.534	6.432	35.116	27.588	195.05	-93.88	0.384	
1100.0	1110.7	6.163	6.059	35.109	27.632	204.74	-86.71	0.382	
1150.0	1161.3	5.862	5.755	35.104	27.666	213.36	-80.17	0.380	
1200.0	1211.9	5.496	5.387	35.072	27.687	222.66	-73.48	0.380	
1300.0	1313.2	5.258	5.142	35.092	27.732	230.77	-67.00	0.376	

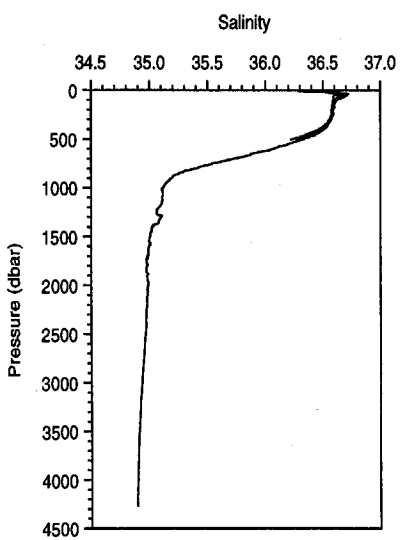
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.617	4.498	35.020	27.749	243.91	-58.64	0.376	
1500.0	1516.0	4.335	4.209	35.000	27.764	250.92	-53.74	0.375	
1600.0	1617.4	4.180	4.047	34.992	27.775	254.49	-51.34	0.371	
1700.0	1718.9	4.043	3.902	34.986	27.785	257.29	-49.57	0.371	
1800.0	1820.5	3.887	3.738	34.974	27.792	259.70	-48.37	0.371	
1900.0	1922.1	3.846	3.689	34.982	27.804	260.01	-48.34	0.369	
2000.0	2023.7	3.754	3.588	34.984	27.816	259.92	-49.12	0.369	
2100.0	2125.4	3.644	3.470	34.978	27.823	260.44	-49.45	0.369	
2200.0	2227.2	3.545	3.362	34.977	27.832	260.84	-49.81	0.369	
2300.0	2328.9	3.432	3.241	34.970	27.839	261.85	-49.68	0.369	
2400.0	2430.8	3.347	3.147	34.970	27.848	261.67	-50.52	0.368	
2500.0	2532.7	3.233	3.025	34.963	27.853	262.40	-50.68	0.367	
2600.0	2634.6	3.118	2.902	34.956	27.859	262.98	-51.02	0.366	
2700.0	2736.6	3.024	2.800	34.950	27.864	263.45	-51.29	0.366	
2800.0	2838.6	2.933	2.700	34.945	27.868	264.39	-51.08	0.366	
2900.0	2940.7	2.811	2.571	34.937	27.874	265.15	-51.30	0.366	
3000.0	3042.8	2.730	2.480	34.932	27.878	265.95	-51.16	0.366	
3100.0	3144.9	2.628	2.370	34.926	27.882	266.60	-51.33	0.365	
3200.0	3247.2	2.547	2.280	34.921	27.886	266.92	-51.68	0.365	
3300.0	3349.4	2.469	2.193	34.917	27.889	266.94	-52.29	0.364	
3400.0	3451.7	2.407	2.122	34.912	27.891	266.99	-52.75	0.364	
3500.0	3554.1	2.362	2.067	34.909	27.893	267.00	-53.12	0.364	
3600.0	3656.5	2.321	2.016	34.905	27.895	266.30	-54.15	0.365	
3700.0	3758.9	2.304	1.988	34.903	27.895	265.77	-54.83	0.364	
3800.0	3861.4	2.269	1.942	34.900	27.896	265.25	-55.64	0.365	
3900.0	3964.0	2.256	1.919	34.898	27.896	264.26	-56.73	0.366	
4000.0	4066.5	2.248	1.899	34.896	27.896	263.35	-57.72	0.367	
4100.0	4169.2	2.230	1.869	34.893	27.896	262.20	-59.02	0.369	
4200.0	4271.8	2.225	1.853	34.891	27.896	261.20	-60.06	0.371	

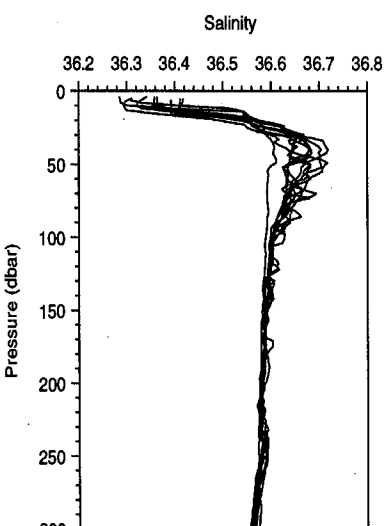
BATS 69—CTD Temperature Profiles



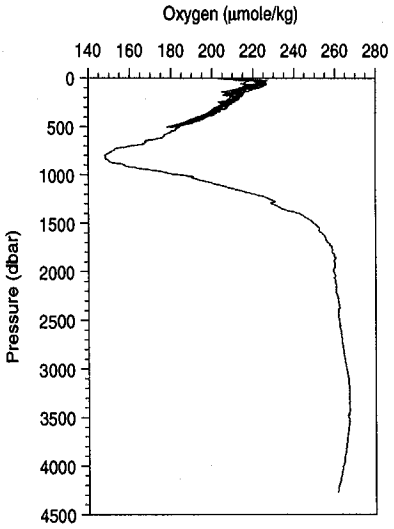


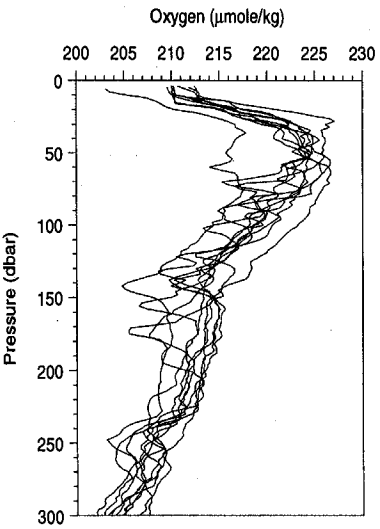
BATS 69—CTD Salinity Profiles



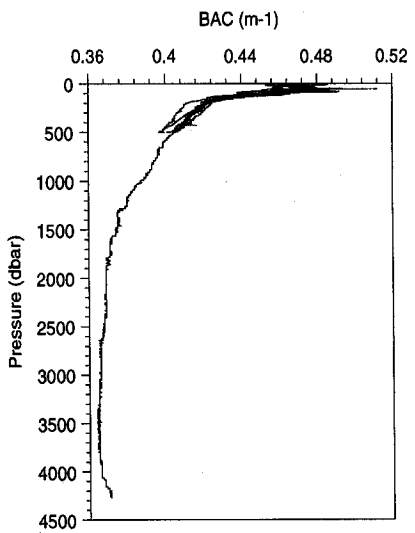


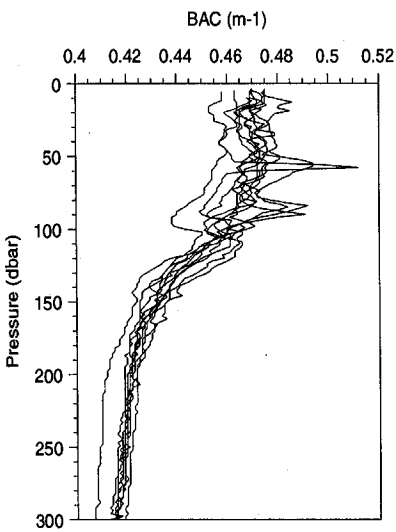
BATS 69—CTD Oxygen Profiles



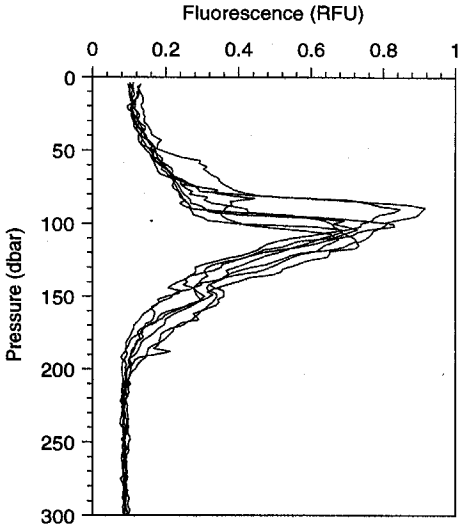


BATS 69—CTD BAC Profiles

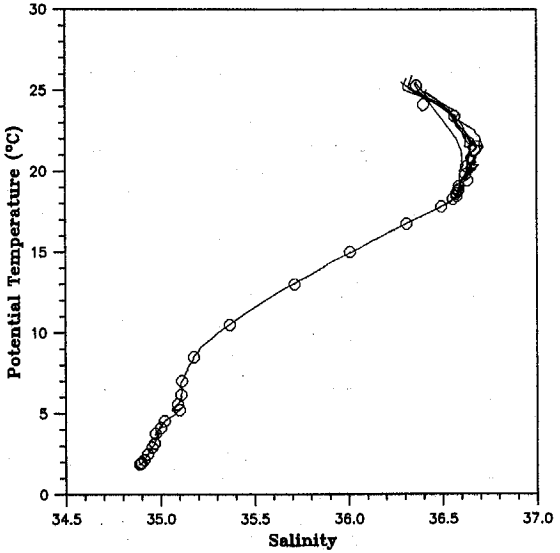




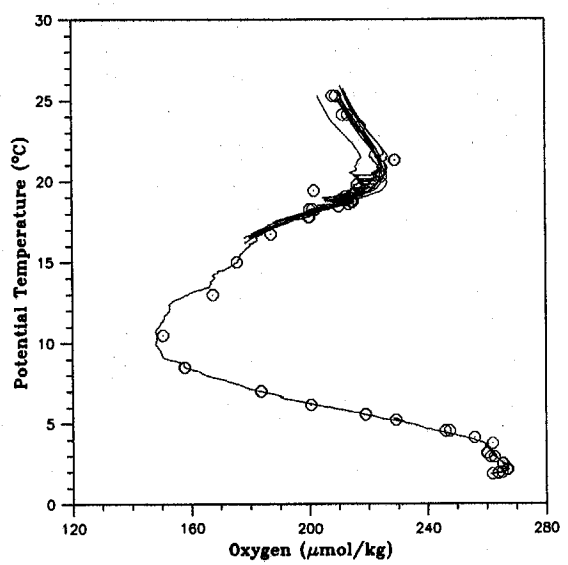
BATS 69—Fluorescence Profile



BATS 69—T-S Diagram



BATS 69—T-O Diagram



BATS 69—Bottle Data
June 13-17, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10690501	2.8	2.8	25.276	36.361	25.275	36.364	24.290
10690502	2.8	2.9	25.227	36.362	25.227		24.304
10690504	10.6	10.6	24.585	36.412	24.582		24.538
10690503	10.8	10.9	24.108	36.488	24.105	36.401	24.673
10690505	18.7	18.8	23.387	36.566	23.383	36.566	25.012
10690506	19.7	19.9	23.326	36.566	23.322		25.030
10690507	40.0	40.3	21.301	36.675	21.293	36.674	25.689
10690508	40.5	40.8	21.260	36.672	21.252		25.700
10690510	60.1	60.5	20.279	36.630	20.268		25.935
10690509	60.4	60.8	20.294	36.630	20.283	36.629	25.931
10690512	79.3	79.9	19.802	36.625	19.787		26.060
10690511	80.1	80.7	19.800	36.625	19.785	36.624	26.060
10690514	98.9	99.6	19.460	36.636	19.442		26.159
10690513	99.7	100.4	19.438	36.634	19.420	36.635	26.164
10690516	119.6	120.4	19.066	36.590	19.045		26.226
10690515	119.8	120.7	19.068	36.590	19.046	36.589	26.226
10690517	139.5	140.5	18.865	36.588	18.840	36.587	26.277
10690518	139.9	140.9	18.862	36.587	18.837		26.278
10690520	160.5	161.6	18.770	36.586	18.741		26.302
10690519	160.5	161.7	18.769	36.586	18.740	36.584	26.301
10690521	201.2	202.8	18.628	36.576	18.592	36.575	26.331
10690522	201.5	203.0	18.626	36.575	18.590		26.332
10690523	250.6	252.5	18.491	36.579	18.447	36.577	26.370
10690524	250.8	252.7	18.491	36.579	18.447		26.371
10690301	302.5	304.8	18.325	36.557	18.271	36.557	26.399
10690302	400.0	403.2	17.867	36.495	17.797	36.495	26.469
10690303	502.5	506.6	16.821	36.308	16.737	36.310	26.584
10690304	598.1	603.2	15.085	36.010	14.992	36.009	26.753
10690305	702.3	708.4	13.081	35.712	12.981	35.713	26.950
10690306	804.2	811.4	10.578	35.366	10.477	35.369	27.158
10690307	903.5	911.8	8.591	35.177	8.490	35.177	27.338
10690308	994.6	1004.0	7.111	35.114	7.010	35.114	27.508
10690309	1101.3	1112.0	6.263	35.110	6.157	35.111	27.620
10690310	1201.8	1213.7	5.669	35.092	5.559	35.093	27.682
10690311	1301.4	1314.6	5.327	35.102	5.210	35.102	27.732
10690312	1402.5	1417.1	4.645	35.022	4.526	35.022	27.747
10690313	1601.3	1618.8	4.244	35.001	4.109	35.002	27.776
10690314	1802.1	1822.6	3.892	34.974	3.743	34.974	27.792
10690317	2402.7	2433.5	3.348	34.970	3.148	34.969	27.847
10690318	2603.3	2638.0	3.120	34.956	2.904	34.955	27.858
10690320	3001.7	3044.5	2.732	34.933	2.483	34.933	27.878
10690319	3002.3	3045.2	2.729	34.932	2.479	34.933	27.878
10690321	3398.0	3449.7	2.411	34.912	2.126	34.914	27.892
10690322	3801.4	3862.8	2.273	34.900	1.947	34.899	27.895
10690323	4001.1	4067.7	2.247	34.896	1.898	34.895	27.896
10690324	4201.9	4273.8	2.225	34.891	1.853	34.889	27.894

BATS 69—Bottle Data
June 13-17, 1994
Gases

Bottle ID	Depth (m)	$O_2(1)$ (μmole/kg)	$O_2(2)$ (μmole/kg)	$O_2(1)$ anomaly (μmole/kg)	$O_2(2)$ anomaly (μmole/kg)	TCO_2 (μmole/kg)
10690501	2.8	208.11	209.24	9.36	10.49	2035
10690503	10.8	213.21	211.51	10.76	9.06	2037
10690505	18.7	217.61	217.52	12.83	12.74	2045
10690507	40.0	229.39	229.08	17.31	17.00	2047
10690509	60.4	224.69		8.74		2056
10690511	80.1	216.45	216.62	-1.43	-1.25	2064
10690513	99.7	201.79	201.88	-17.50	-17.41	2081
10690515	119.8	212.49	212.36	-8.35	-8.48	2074
10690517	139.5	211.05	210.88	-10.60	-10.78	2076
10690519	160.5	214.44	215.05	-7.61	-7.00	
10690521	201.2	213.53	213.53	-9.11	-9.11	2076
10690523	250.6	210.20	210.29	-12.99	-12.90	2081
10690301	302.5	200.28	201.28	-23.63	-22.63	
10690302	400.0	199.93	200.36	-26.00	-25.56	
10690303	502.5	187.08	187.21	-43.64	-43.51	
10690304	598.1	175.63	175.59	-63.49	-63.53	
10690305	702.3	167.35	167.48	-82.11	-81.98	
10690306	804.2	150.59	150.42	-112.95	-113.12	
10690307	903.5	157.92	157.71	-117.70	-117.92	
10690308	994.6	183.44	183.74	-101.68	-101.38	
10690309	1101.3	200.55	200.38	-90.22	-90.39	
10690310	1201.8	218.83	219.00	-76.06	-75.89	
10690311	1301.4	229.18	229.31	-68.08	-67.95	
10690312	1402.5	245.93	247.45	-56.40	-54.88	
10690313	1601.3	255.81	255.85	-49.53	-49.48	
10690314	1802.1	261.93		-46.09		
10690317	2402.7	260.02	260.28	-52.16	-51.90	
10690318	2603.3	261.21	262.52	-52.77	-51.46	
10690320	3001.7	265.35	265.48	-51.74	-51.61	
10690319	3002.3	265.31	265.36	-51.80	-51.76	
10690321	3398.0	266.73	267.08	-52.98	-52.63	
10690322	3801.4	265.21	265.08	-55.64	-55.78	
10690323	4001.1		263.76		-57.32	
10690324	4201.9	261.87	261.83	-59.40	-59.44	

BATS 69—Bottle Data
June 13-17, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10690501	2.8	0.00	0.00	0.08	0.8
10690503	10.8	0.00	0.00	0.00	0.8
10690505	18.7	0.00	0.00	0.15	0.7
10690507	40.0	0.00	0.00	0.00	0.7
10690509	60.4	0.00	0.00	0.00	0.7
10690511	80.1	0.00	0.00	0.00	0.7
10690513	99.7	0.46	0.09	0.00	0.8
10690515	119.8	0.88	0.03	0.00	0.7
10690517	139.5	1.48	0.03	0.14	0.9
10690519	160.5	1.42	0.00	0.06	1.0
10690521	201.2	1.87	0.00	0.09	1.1
10690523	250.6	2.29	0.00	0.10	1.3
10690301	302.5	3.51	0.00	0.21	1.2
10690302	400.0	4.57	0.00	0.23	1.7
10690303	502.5	7.47	0.00	0.45	2.6
10690304	598.1	11.43	0.00	0.67	4.5
10690305	702.3	15.36	0.00	1.17	7.1
10690306	804.2	19.03	0.00	1.42	11.8
10690307	903.5	22.76	0.00	1.63	14.4
10690308	994.6	21.73	0.00	1.53	14.4
10690309	1101.3	21.13	0.00	1.53	14.8
10690310	1201.8	19.83	0.00	1.35	13.9
10690311	1301.4	19.28	0.00	1.29	13.7
10690312	1402.5	17.66	0.00	1.31	13.0
10690313	1601.3	17.88	0.00	1.21	13.5
10690314	1802.1	17.82	0.00	1.25	13.9
10690317	2402.7	18.31	0.00	1.30	19.5
10690318	2603.3	18.31	0.00		21.3
10690320	3001.7	17.93	0.00	1.29	23.1
10690319	3002.3		0.00		23.4
10690321	3398.0	17.67	0.00	1.30	27.1
10690322	3801.4		0.00		31.4
10690323	4001.1	18.90	0.00	1.38	33.4
10690324	4201.9	19.28	0.00	1.56	35.9

BATS 69—Bottle Data
June 13-17, 1994
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10690502	2.8	37.26	5.98	4.89	0.049	0.010
10690504	10.6	33.39	2.96	5.36	0.078	0.000
10690506	19.7	30.67	3.40	6.63	0.049	0.000
10690508	40.5	34.05	4.43	5.43	0.068	0.010
10690510	60.1	28.29	3.70	6.11	0.107	0.000
10690512	79.3	24.23	4.13	4.59	0.166	0.010
10690514	98.9	26.99	4.43	3.16	0.292	0.224
10690516	119.6	18.05	2.51	2.45	0.049	0.185
10690518	139.9	8.64	1.03	2.67	0.068	0.068
10690520	160.5	14.81	3.39	1.73	0.058	0.019
10690522	201.5	9.01	1.63	1.72	0.000	0.010
10690524	250.8	5.73	1.11	2.17	0.000	0.000
10690301	302.5	6.24	1.27	1.53		
10690302	400.0	9.50	1.27	1.26		
10690303	502.5	2.69	0.60			
10690304	598.1	7.89	0.75			
10690305	702.3	12.23	2.37			
10690306	804.2	4.68	0.31			
10690307	903.5	7.25	0.90			
10690308	994.6	3.44	0.46			
10690309	1101.3			0.50		
10690312	1402.5			0.31		
10690319	3002.3			0.18		
10690323	4001.1			0.27		

BATS 69—Bottle Data
June 13-17, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10690502	2.8	0	4	5	12	5	0	41	0
10690504	10.6	1	5	5	11	5	0	38	0
10690506	19.7	0	3	5	12	5	0	26	0
10690508	40.5	3	4	5	19	14	9	50	0
10690510	60.1	4	8	5	23	23	11	74	0
10690512	79.3	7	14	5	40	31	19	130	0
10690514	98.9	25	67	5	138	35	104	378	22
10690516	119.6	7	35	5	37	7	58	141	14
10690518	139.9	8	32	5	29	3	29	93	5
10690520	160.5	4	19	5	13	0	9	44	1
10690522	201.5	0	0	5	0	0	0	0	0
10690524	250.8	0	0	5	0	0	0	0	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10690502	2.8	0	0	0	0	9	0	0
10690504	10.6	0	0	0	0	6	0	0
10690506	19.7	0	0	0	0	5	0	0
10690508	40.5	0	0	0	0	5	0	0
10690510	60.1	0	0	0	0	3	0	0
10690512	79.3	7	0	0	0	7	0	0
10690514	98.9	24	0	0	0	14	0	3
10690516	119.6	12	0	0	0	3	0	0
10690518	139.9	5	0	0	0	2	0	0
10690520	160.5	4	0	0	0	1	0	0
10690522	201.5	0	0	0	0	0	0	0
10690524	250.8	0	0	0	0	0	0	0

BATS 69: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	3.16		4.12	0.45	0.49	1.07	1.05	1.07
20	4.96	3.60	5.00	0.50	0.55	0.55	0.43	0.58
40	4.39	4.76	3.57	0.53	0.38	1.00	0.93	1.05
60	3.74	3.09	3.81	0.51	0.43	1.16	0.91	1.07
80	2.47	3.53	3.43	0.43	0.50	1.13	0.59	0.43
100	1.97	2.01	1.86	0.38	0.45	0.23	0.29	0.28
120	0.87	0.73	0.70	0.34	0.39	0.34	0.39	0.34
140	0.35	0.33	0.37	0.29	0.40	0.22	0.22	0.22

BATS 69: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	361	77.90	18.36	2.96
150	362	60.05	15.14	2.40
150	363	67.35	16.93	2.29
200	364	68.97	14.34	1.87
200	365	98.99	25.12	3.91
200	366	90.07	24.19	3.32
300	367	72.22	14.92	2.07
300	368	101.43	21.77	2.35
300	369	67.35	14.25	1.89

BATS 70

Cruise Report
Cruise dates: July 18-21, 1994
Personnel: F. Howse, R. Little, R. Kelly, R. Johnson, L. Caporelli, F. Bahr, M. Krasowski
R/V Weatherbird II

18 July 1994

0700 - Depart BBSR.

1421 - Deploy PITs. Lat: 31.576 N; Long: 64.162 W

1458 - BBOP cast. Lat: 31.579 N; Long: 64.170 W

1516 - **CTD cast 1**, 500 m cast. (Buesseler)
Lat: 31.579 N; Long: 64.172 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 180, 200, replicates at 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 m.

1635 - CTD cast 1 on deck. Lat: 31.572 N; Long: 64.170 W

1747 - **CTD cast 2**, 4200 m cast.
Lat: 31.669 N; Long: 64.173 W
Rosette malfunction. Bottles firing randomly.
Nominal depths: 300, 400, 500, 600, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3400, 3500, 3800, 3800, 4000, 4200, 3000, 2000, and 700 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 1400, 2000, 2600, 3500 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1000, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3800, 4000, and 4200 m.

2127 - CTD cast 2 on deck. Lat: 31.674 N; Long: 64.182 W

2157 - BBOP cast. Lat: 31.670 N; Long: 64.176 W

2317 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.574 N; Long: 64.191 W

2358 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.578 N; Long: 64.191 W

19 July 1994

0045 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.588 N; Long: 64.196 W

0104 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.591 N; Long: 64.196 W

0128 - Zooplankton tow (Taylor), 0-100 m (20 μm net). Lat: 31.590 N; Long: 64.193 W

0328 - BBOP cast. Lat: 31.663 N; Long: 64.167 W

0352 - **GoFlo cast #1**, 140 m.
Lat: 31.661 N; Long: 64.169 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths
I2 production	8 depths
dissolved I (Jickells)	8 depths

0557 - Deploy primary production array.
Lat: 31.662 N; Long: 64.172 W

0618 - BBOP cast. Lat: 31.668 N; Long: 64.176 W

0637 - **CTD cast 3**, 500 m cast.
Lat: 31.668 N; Long: 64.175 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 200, 200, 250, 250 m.

Samples taken:

acantharia (Michaels)	top 10 depths
dissolved I (Jickells)	160, 200, and 250 m.
particulate I (Jickells)	top 11 depths

0744 - CTD cast 3 on deck. Lat: 31.674 N; Long: 64.178 W

0800 - BBOP cast. Lat: 31.675 N; Long: 64.180 W

0925 - Problem with the hydraulics causing delays.

0934 - BBOP cast. Lat: 31.671 N; Long: 64.176 W

0953 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.671 N; Long: 64.177 W

1043 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.671 N; Long: 64.178 W

1112 - Begin Wakeham pumping. Lat: 31.670 N; Long: 64.180 W

1145 - BBOP cast. Lat: 31.671 N; Long: 64.170 W

1233 - **CTD cast 4**, 500 m cast.
Lat: 31.674 N; Long: 64.187 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
DOC	12 depths
DON	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
POC/PON	12 depths

PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths

1345 - CTD cast 4 on deck. Lat: 31.675 N; Long: 64.193 W

1404 - BBOP cast. Lat: 31.677 N; Long: 64.194 W

1445 - End Wakeham pumping. Lat: 31.677 N; Long: 64.201 W

1513 - BBOP cast. Lat: 31.678 N; Long: 64.202 W

1610 - BBOP cast. Lat: 31.681 N; Long: 64.214 W

1635 - **CTD cast 5**, 500 m. Lat: 31.681 N; Long: 64.215 W
Calibration cast. No bottles fired.

1659 - CTD cast 5 on deck. Lat: 31.682 N; Long: 64.218 W

1705 - **CTD cast 6**, 500 m cast.
Lat: 31.682 N; Long: 64.219 W
Nominal depths: 1, 1, 10, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 200, 250, 250, 250, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
ACDOM (Nelson)	1, 10, 20, 40, 60, 80, 100, 120, 150, 160, 200, and 250 m.
AP (Nelson)	1, 20, 40, 60, 80, and 100 m.
chlorophyll *a*/HPLC	1, 20, 40, 60, 80, and 100 m.
Elzone (BBOP)	1, 10, 20, 40, 60, 80, 100 and 110 m.
chl *a* (BBOP)	1, 10, 30, 50, 70, 90, 110, 130, 150, 160, and 200 m.

1800 - CTD cast 6 on deck. Lat: 31.682 N; Long: 64.217 W

1838 - BBOP cast. Lat: 31.683 N; Long: 64.221 W

1945 - BBOP cast. Lat: 31.630 N; Long: 64.186 W

2045 - Recover primary production array.
Lat: 31.622 N; Long: 64.181 W

2122 - BBOP cast. Lat: 31.618 N; Long: 64.179 W

2145 - Plankton tow (Bush), surface (335 µm net).

2245 - Depart for Station S.

20 July 1994

0343 - **HS 770 CTD cast,** 2600 m.
Lat: 32.164 N; Long: 64.499 W

0632 - HS 770 CTD cast on deck. Lat: 32.153 N; Long: 64.505 W

0823 - **CTD cast 7**, 250 m cast.
Lat: 32.144 N; Long: 64.516 W
Nominal depths: 1, 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,10,15, 20, 30, 40, 60, 80, 100, 120, 140, 140m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths
chl *a* (BBOP)	1, 10, 20, 40, 60, 80, 100, 120, and 140 m.

0928 - CTD cast 7 on deck. Lat: 32.133 N; Long: 64.523 W

0932 - BBOP cast. Lat: 32.671 N; Long: 64.176 W

0955 - Depart for BBSR.

1252 - Arrive BBSR

21 July 1994

0800 - Depart BBSR.

1310 - Plankton tow (Elardo), surface (335 µm net).

1330 - BBOP cast. Lat: 31.759 N; Long: 64.776 W

1648 - **CTD cast 8**, 500 m cast. Troubleshooting the CTD.
Lat: 31.401 N; Long: 64.281 W

1717 - CTD cast 8 on deck. Lat: 31.398 N; Long: 64.284 W

1717 - **CTD cast 9**, 500 m cast. (Buesseler)
Lat: 31.398 N; Long: 64.284 W
Nominal depths: 1, replicates at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,150, 150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

1824 - CTD cast 9 on deck. Lat: 31.382 N; Long: 64.287 W

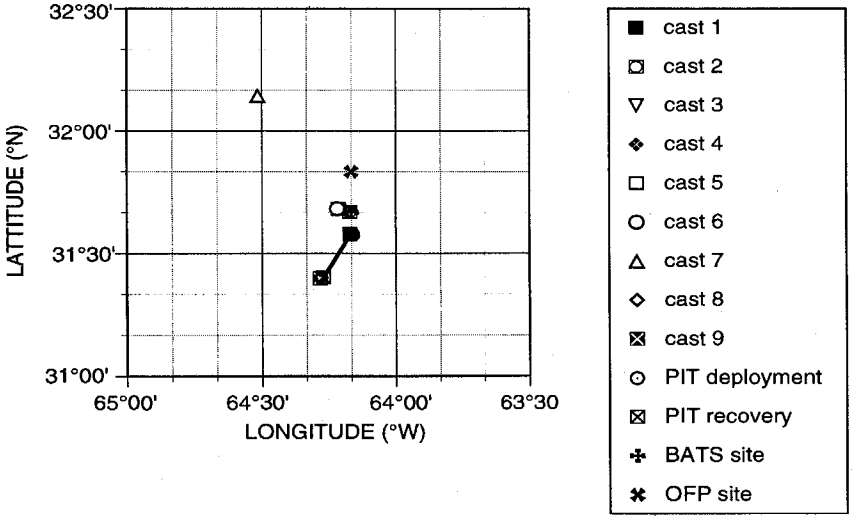
1856 - Recover PITs. Lat: 31.403 N; Long: 64.272 W

2043 - Depart for BBSR.

22 July 1994

0445 - Arrive BBSR.

Cast positions: BATS 70

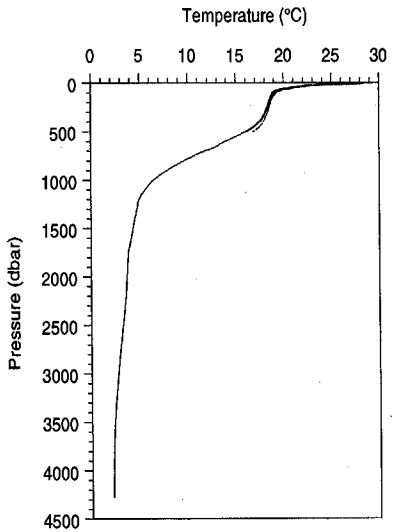


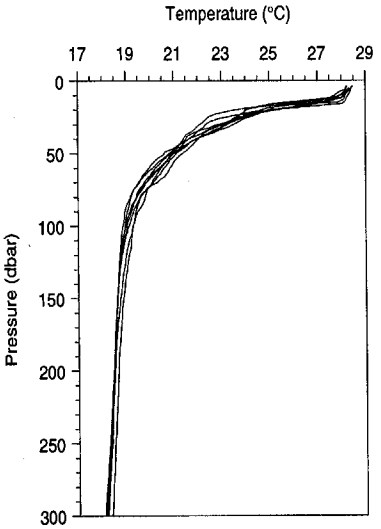
BATS 70, CTD Cast 2
July 18, 1994
Start cast: time: 1747 lat: 31.669 N long: 64.173 W
End cast: time: 2127 lat: 31.674 N long: 64.182 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
4.0	4.0	28.479	28.478	36.481	23.353	201.80	13.10	0.473	
10.0	10.1	28.177	28.175	36.479	23.452	201.55	11.96	0.476	
20.0	20.1	25.392	25.387	36.477	24.340	216.68	18.47	0.483	
30.0	30.2	23.495	23.489	36.520	24.946	224.97	20.50	0.484	
40.0	40.3	21.924	21.916	36.574	25.440	232.03	22.08	0.495	
50.0	50.4	21.120	21.111	36.585	25.672	236.51	23.62	0.504	
60.0	60.4	20.374	20.363	36.593	25.882	237.23	21.53	0.507	
70.0	70.5	19.766	19.753	36.595	26.046	234.13	16.07	0.505	
80.0	80.6	19.433	19.418	36.599	26.136	227.29	7.92	0.491	
90.0	90.6	19.156	19.140	36.593	26.204	221.14	0.66	0.478	
100.0	100.7	18.983	18.965	36.589	26.247	214.85	-6.33	0.477	
110.0	110.8	18.848	18.828	36.583	26.277	213.36	-8.37	0.465	
120.0	120.9	18.791	18.769	36.582	26.291	213.91	-8.06	0.458	
130.0	131.0	18.750	18.727	36.583	26.303	214.99	-7.13	0.453	
140.0	141.0	18.684	18.659	36.582	26.320	215.24	-7.16	0.447	
150.0	151.1	18.628	18.601	36.580	26.332	215.26	-7.38	0.440	
160.0	161.2	18.578	18.549	36.576	26.343	214.25	-8.59	0.435	
170.0	171.3	18.550	18.519	36.576	26.350	214.45	-8.51	0.432	
180.0	181.3	18.513	18.481	36.571	26.356	216.64	-6.48	0.429	
190.0	191.4	18.493	18.459	36.570	26.361	216.60	-6.60	0.429	
200.0	201.5	18.472	18.436	36.570	26.366	215.31	-7.97	0.428	
210.0	211.6	18.446	18.409	36.569	26.373	213.87	-9.52	0.426	
220.0	221.7	18.416	18.377	36.566	26.379	213.60	-9.92	0.426	
230.0	231.7	18.390	18.350	36.565	26.385	212.91	-10.72	0.425	
240.0	241.8	18.356	18.313	36.561	26.391	210.56	-13.22	0.423	
250.0	251.9	18.320	18.276	36.560	26.399	211.10	-12.83	0.422	
275.0	277.1	18.204	18.156	36.547	26.420	207.46	-16.96	0.421	
300.0	302.3	18.111	18.058	36.538	26.437	209.68	-15.15	0.420	
325.0	327.5	18.041	17.984	36.529	26.449	208.89	-16.25	0.418	
350.0	352.7	17.928	17.866	36.510	26.463	205.84	-19.81	0.417	
375.0	378.0	17.685	17.620	36.467	26.491	201.21	-25.52	0.415	
400.0	403.2	17.435	17.367	36.421	26.518	197.37	-30.50	0.414	
425.0	428.4	17.200	17.128	36.378	26.543	193.40	-35.56	0.412	
450.0	453.6	16.946	16.870	36.332	26.569	189.10	-41.04	0.410	
475.0	478.9	16.453	16.374	36.243	26.618	182.37	-50.09	0.409	
500.0	504.1	16.033	15.952	36.174	26.663	182.75	-51.72	0.407	
550.0	554.6	15.003	14.917	35.999	26.761	171.95	-67.57	0.405	
600.0	605.1	13.866	13.777	35.819	26.868	165.98	-79.35	0.403	
650.0	655.6	13.001	12.909	35.692	26.948	158.95	-90.94	0.401	
700.0	706.1	11.722	11.629	35.516	27.061	152.88	-104.06	0.396	
750.0	756.6	10.570	10.476	35.371	27.159	150.92	-112.66	0.393	
800.0	807.2	9.527	9.433	35.259	27.250	152.83	-116.98	0.392	
850.0	857.7	8.612	8.518	35.188	27.343	159.75	-115.72	0.390	
900.0	908.3	7.796	7.702	35.145	27.433	172.85	-107.79	0.388	
950.0	958.9	7.021	6.926	35.111	27.517	187.74	-97.98	0.388	
1000.0	1009.4	6.355	6.260	35.095	27.594	204.42	-85.76	0.386	
1050.0	1060.0	5.914	5.817	35.081	27.641	216.10	-77.12	0.383	
1100.0	1110.7	5.533	5.434	35.068	27.678	226.68	-69.21	0.382	
1150.0	1161.3	5.168	5.067	35.045	27.704	235.73	-62.79	0.380	
1200.0	1211.9	4.934	4.831	35.034	27.722	241.50	-58.71	0.379	
1300.0	1313.2	4.710	4.599	35.033	27.747	247.39	-54.45	0.377	

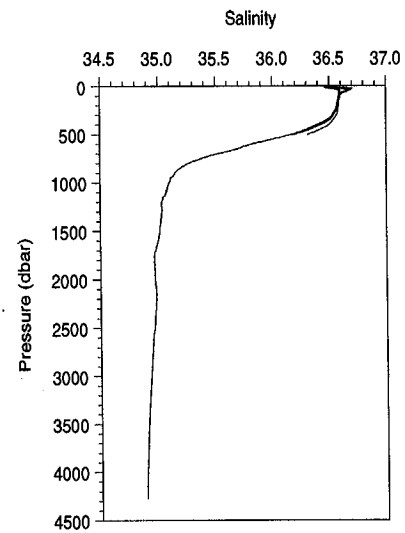
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.503	4.385	35.023	27.764	251.06	-52.31	0.376	
1500.0	1516.0	4.315	4.190	35.013	27.777	253.79	-50.98	0.374	
1600.0	1617.4	4.121	3.988	34.996	27.784	256.90	-49.36	0.374	
1700.0	1718.9	3.887	3.747	34.968	27.787	260.28	-47.80	0.374	
1800.0	1820.5	3.798	3.650	34.965	27.795	261.47	-47.29	0.373	
1900.0	1922.1	3.753	3.596	34.971	27.804	261.01	-48.07	0.371	
2000.0	2023.7	3.676	3.511	34.973	27.814	260.76	-48.90	0.372	
2100.0	2125.4	3.635	3.460	34.980	27.825	258.80	-51.16	0.369	
2200.0	2227.2	3.556	3.373	34.979	27.833	258.97	-51.59	0.368	
2300.0	2328.9	3.457	3.266	34.976	27.841	259.52	-51.80	0.368	
2400.0	2430.8	3.353	3.154	34.969	27.846	260.41	-51.73	0.367	
2500.0	2532.7	3.234	3.026	34.960	27.851	261.68	-51.40	0.367	
2600.0	2634.6	3.115	2.899	34.952	27.856	263.50	-50.53	0.367	
2700.0	2736.6	3.017	2.793	34.947	27.862	264.16	-50.65	0.367	
2800.0	2838.6	2.896	2.664	34.940	27.868	265.20	-50.58	0.367	
2900.0	2940.7	2.813	2.573	34.936	27.873	265.50	-50.94	0.366	
3000.0	3042.8	2.720	2.471	34.930	27.877	266.44	-50.76	0.365	
3100.0	3144.9	2.621	2.364	34.925	27.881	267.00	-50.99	0.365	
3200.0	3247.2	2.544	2.278	34.920	27.885	267.57	-51.05	0.365	
3300.0	3349.4	2.470	2.195	34.915	27.888	267.70	-51.52	0.365	
3400.0	3451.7	2.402	2.117	34.910	27.890	267.66	-52.12	0.364	
3500.0	3554.1	2.338	2.044	34.905	27.892	267.42	-52.90	0.364	
3600.0	3656.5	2.299	1.995	34.902	27.894	266.65	-53.99	0.365	
3700.0	3758.9	2.273	1.958	34.899	27.894	266.10	-54.75	0.365	
3800.0	3861.4	2.253	1.927	34.897	27.895	265.19	-55.83	0.365	
3900.0	3964.0	2.236	1.899	34.894	27.895	264.39	-56.79	0.367	
4000.0	4066.5	2.223	1.875	34.892	27.895	263.12	-58.16	0.368	
4100.0	4169.2	2.209	1.849	34.889	27.895	262.04	-59.36	0.373	
4200.0	4271.8	2.216	1.844	34.888	27.895	261.04	-60.31	0.373	

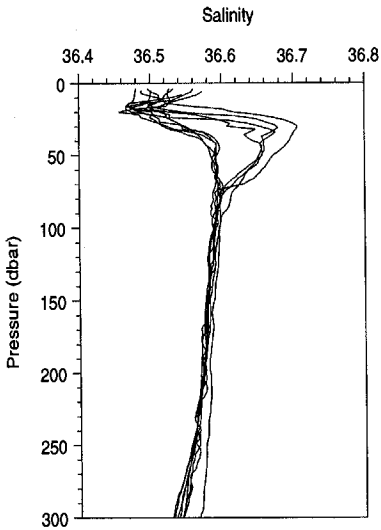
BATS 70—CTD Temperature Profiles



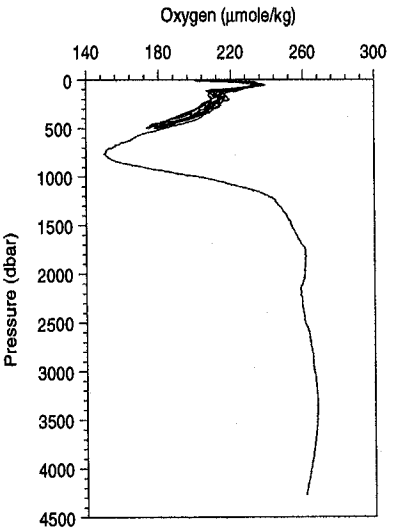


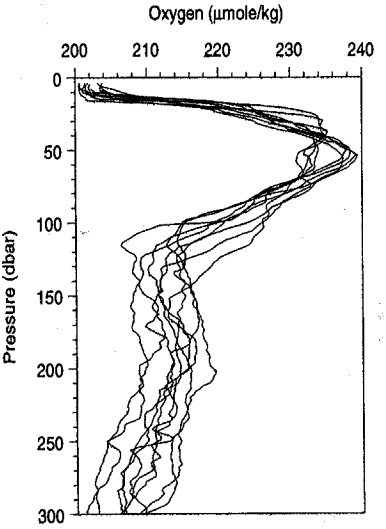
BATS 70—CTD Salinity Profiles



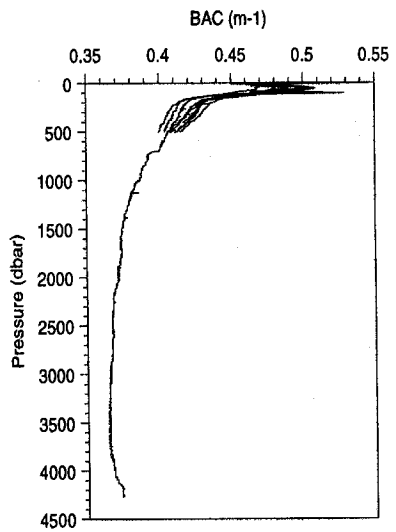


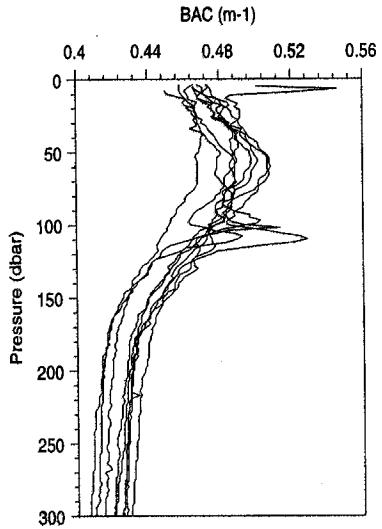
BATS 70—CTD Oxygen Profiles



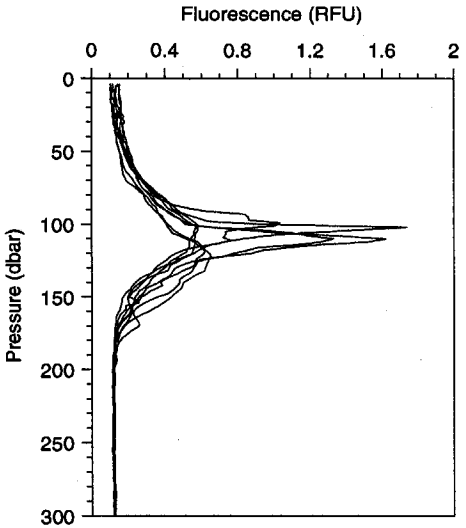


BATS 70—CTD BAC Profiles

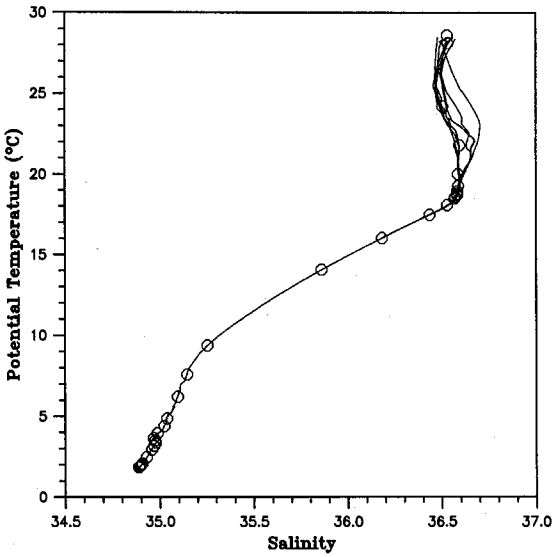




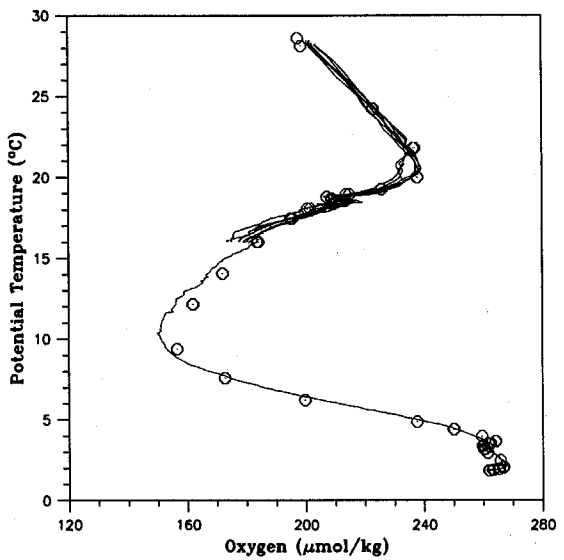
BATS 70—CTD Fluorescence Profile



BATS 70—T-S Diagram



BATS 70—T-O Diagram



BATS 70—Bottle Data
July 18-21, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	Sigma$_\theta$ (kg/m^3)
10700401	1.7	1.7	28.610	36.532	28.610	36.531	23.347
10700402	1.8	1.8	28.607	36.531	28.606		23.348
10700404	11.5	11.6	28.133	36.533	28.130		23.508
10700403	12.1	12.1	28.127	36.534	28.124	36.535	23.511
10700406	21.2	21.4	23.547	36.514	23.543		24.925
10700405	21.4	21.6	24.221	36.504	24.216	36.506	24.719
10700408	40.7	41.0	21.841	36.596	21.833		25.479
10700407	40.9	41.2	21.807	36.594	21.799	36.596	25.490
10700410	61.7	62.1	20.032	36.589	20.020		25.970
10700409	62.5	62.9	20.012	36.590	20.000	36.588	25.975
10700412	80.9	81.5	19.283	36.589	19.268		26.168
10700411	81.1	81.7	19.283	36.589	19.268	36.589	26.168
10700413	100.6	101.4	18.953	36.587	18.934	36.585	26.252
10700414	100.8	101.6	18.951	36.587	18.933		26.253
10700416	120.7	121.6	18.794	36.586	18.773		26.294
10700415	120.7	121.6	18.793	36.586	18.771	36.585	26.293
10700418	140.6	141.7	18.703	36.585	18.678		26.317
10700417	141.0	142.1	18.704	36.585	18.678	36.584	26.316
10700419	159.9	161.0	18.602	36.575	18.573	36.574	26.335
10700420	160.4	161.5	18.601	36.574	18.572		26.336
10700421	200.6	202.1	18.495	36.569	18.459	36.568	26.360
10700422	200.8	202.3	18.496	36.569	18.460		26.360
10700424	250.0	251.9	18.355	36.559	18.311		26.390
10700201	301.4	303.8	18.117	36.531	18.064	36.530	26.430
10700202	401.1	404.3	17.527	36.435	17.458	36.436	26.507
10700203	502.2	506.4	16.095	36.181	16.013	36.184	26.656
10700204	601.4	606.5	14.151	35.860	14.061	35.861	26.841
10700224	681.3	687.2	12.241	35.591	12.148		27.020
10700205	800.8	808.0	9.466	35.254	9.372	35.253	27.256
10700206	900.7	909.0	7.681	35.145	7.586	35.145	27.449
10700207	1001.8	1011.2	6.310	35.095	6.215	35.096	27.601
10700208	1199.7	1211.6	4.963	35.038	4.860	35.038	27.722
10700209	1400.7	1415.3	4.507	35.022	4.389	35.023	27.763
10700210	1600.4	1617.8	4.088	34.987	3.956	34.987	27.781
10700211	1800.1	1820.6	3.790	34.965	3.643	34.966	27.796
10700212	1995.4	2019.1	3.679	34.974	3.514	34.974	27.815
10700223	2044.1	2068.6	3.683	34.980	3.514		27.820
10700213	2200.9	2228.0	3.552	34.979	3.369	34.980	27.834
10700214	2400.8	2431.6	3.354	34.969	3.154	34.970	27.846
10700215	2600.4	2635.0	3.139	34.957	2.923	34.957	27.858
10700222	3003.9	3046.8	2.717	34.930	2.467	34.930	27.877
10700216	3448.5	3501.4	2.371	34.908	2.082	34.907	27.891
10700217	3547.7	3602.9	2.315	34.903	2.016	34.902	27.892
10700218	3739.6	3799.5	2.264	34.898	1.945	34.898	27.895
10700219	3800.5	3861.9	2.252	34.897	1.926	34.896	27.895
10700220	4000.9	4067.5	2.223	34.891	1.875	34.891	27.894
10700221	4202.5	4274.4	2.217	34.888	1.845	34.888	27.894

BATS 70—Bottle Data
July 18-21, 1994
Gases

Bottle ID	Depth (m)	$O_2(1)$ (µmole/kg)	$O_2(2)$ (µmole/kg)	$O_2(1)$ anomaly (µmole/kg)	$O_2(2)$ anomaly (µmole/kg)	TCO_2 (µmole/kg)
10700401	1.7	197.60	197.47	9.34	9.21	2038
10700403	12.1	198.60	198.73	8.93	9.06	2036
10700405	21.4	223.22	222.87	21.19	20.84	2039
10700407	40.9	237.14	236.57	26.79	26.23	2043
10700409	62.5	238.09	237.83	20.99	20.72	2050
10700411	81.1	226.05	225.83	6.08	5.86	2062
10700413	100.6	213.83	215.00	-7.47	-6.30	
10700415	120.7	207.48	207.31	-14.47	-14.64	2075
10700417	141.0	209.13	208.82	-13.19	-13.49	2079
10700419	159.9	212.13	212.61	-10.62	-10.14	2078
10700421	200.6	210.76	210.76	-12.44	-12.44	
10700201	301.4	200.75	201.71	-24.06	-23.11	
10700202	401.1	195.09	195.66	-32.37	-31.81	
10700203	502.2	183.58	184.15	-50.59	-50.02	
10700204	601.4	171.78	172.08	-72.08	-71.77	
10700224	681.3	161.71	162.01	-92.33	-92.02	
10700205	800.8	156.38	156.56	-113.81	-113.63	
10700206	900.7	172.52	172.74	-108.86	-108.64	
10700207	1001.8	199.81	199.59	-90.68	-90.89	
10700208	1199.7	237.70	237.49	-62.29	-62.51	
10700209	1400.7	249.87	250.26	-53.47	-53.08	
10700210	1600.4	259.45	259.58	-47.08	-46.94	
10700211	1800.1	263.92	264.23	-44.90	-44.59	
10700212	1995.4	262.22	262.48	-47.42	-47.16	
10700223	2044.1	261.88	261.62	-47.70	-47.97	
10700213	2200.9	260.08	259.69	-50.50	-50.90	
10700214	2400.8	260.70	260.22	-51.43	-51.91	
10700215	2600.4	261.53	261.27	-52.30	-52.56	
10700222	3003.9	265.82		-51.40		
10700216	3448.5	266.88		-53.16		
10700217	3547.7	266.48	266.83	-54.02	-53.67	
10700218	3739.6	265.56	265.38	-55.37	-55.55	
10700219	3800.5	265.22	264.96	-55.82	-56.08	
10700220	4000.9	263.43	263.08	-57.85	-58.20	
10700221	4202.5	262.12	261.81	-59.22	-59.52	

BATS 70—Bottle Data
July 18-21, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10700401	1.7	0.00	0.00	0.00	0.8
10700403	12.1	0.00	0.00	0.00	0.9
10700405	21.4	0.00	0.00	0.00	0.8
10700407	40.9	0.00	0.00	0.42	0.9
10700409	62.5	0.00	0.00	0.07	0.9
10700411	81.1	0.00	0.00	0.00	1.0
10700413	100.6	0.48	0.13	0.00	1.1
10700415	120.7	1.83	0.07	0.09	1.2
10700417	141.0	1.93	0.00	0.10	1.3
10700419	159.9	1.97	0.00	0.16	1.3
10700421	200.6	2.30	0.00	0.12	1.3
10700201	301.4	3.93	0.00	0.18	1.8
10700202	401.1	5.48	0.03	0.32	2.3
10700203	502.2	8.72	0.00	0.47	3.5
10700204	601.4	13.16	0.00		6.0
10700224	681.3	16.77	0.00	1.20	8.9
10700205	800.8	21.05	0.00	1.61	13.6
10700206	900.7	22.32	0.00	1.69	15.1
10700207	1001.8	20.84	0.00	1.61	14.7
10700208	1199.7	19.02	0.00	1.51	13.4
10700209	1400.7	18.42	0.00	1.45	13.7
10700210	1600.4	17.61	0.00	1.18	13.7
10700211	1800.1	17.67	0.00	1.34	14.2
10700212	1995.4	17.59	0.00	1.39	15.8
10700223	2044.1		0.00	9.78	16.3
10700213	2200.9	18.18	0.00	1.34	18.2
10700214	2400.8	17.72	0.00	1.40	19.8
10700215	2600.4	18.23	0.00	1.39	21.6
10700222	3003.9	17.88	0.00	1.37	23.7
10700216	3448.5	17.93	0.00	1.43	28.2
10700217	3547.7	18.44	0.00	1.40	29.5
10700218	3739.6	18.61	0.00	1.51	31.6
10700219	3800.5	18.75	0.00		32.4
10700220	4000.9	19.26	0.00	1.47	35.1
10700221	4202.5	19.41	0.00		37.2

BATS 70—Bottle Data
July 18-21, 1994
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10700402	1.8	27.07	3.94	3.48		
10700404	11.5	22.79	3.42	4.39	0.073	
10700406	21.2	29.86	4.26	7.03	0.091	
10700408	40.7	45.99	5.92	7.81	0.101	
10700410	61.7	52.34	5.47	8.45	0.205	
10700412	80.9	39.67	4.06	7.38	0.313	
10700414	100.8	26.46	4.32	5.98	0.117	
10700416	120.7	17.38	2.19	3.65	0.118	
10700418	140.6	13.77	1.62	2.67	0.001	
10700420	160.4	10.57	1.30	1.99	0.179	
10700422	200.8	6.50	2.32	1.73	0.079	
10700424	250.0	7.57	1.36	1.54		
10700201	301.4	8.41	1.49	1.19		
10700202	401.1	11.07	1.40	1.17		
10700203	502.2	8.61	1.81			
10700204	601.4	8.26	1.55			
10700224	681.3	8.37	1.23			
10700205	800.8	2.52	1.10			
10700206	900.7	31.11	0.90			
10700207	1001.8	6.26	0.85	0.70		
10700209	1400.7			0.39		
10700222	3003.9			0.36		
10700220	4000.9			0.22		

BATS 70—Bottle Data
July 18-21, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10700404	11.5	0	2	5	11	8	3	38	0
10700406	21.2	0	3	5	14	11	12	46	0
10700408	40.7	0	4	5	17	14	5	58	0
10700410	61.7	6	10	5	29	26	10	105	1
10700412	80.9	7	19	5	52	41	32	188	0
10700414	100.8	2	5	5	18	17	7	65	0
10700416	120.7	2	5	5	18	12	8	65	1
10700418	140.6	4	11	5	30	23	11	101	2
10700420	160.4	3	10	5	28	23	11	100	2
10700422	200.8	0	3	5	9	11	3	48	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10700404	11.5	0	0	0	1	7	0	2
10700406	21.2	0	0	0	1	7	0	1
10700408	40.7	0	0	0	1	5	0	1
10700410	61.7	0	0	0	3	5	1	1
10700412	80.9	0	6	0	4	6	2	0
10700414	100.8	0	0	0	1	5	1	1
10700416	120.7	0	0	0	1	5	1	0
10700418	140.6	0	3	0	2	6	1	0
10700420	160.4	0	0	0	2	5	1	0
10700422	200.8	0	0	0	0	7	0	4

BATS 70: Primary Production and Bacterial Thymidine Uptake

Collection Depth (m)	Primary Production					^{3}H-Thymidine Uptake		
	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	4.12	3.64	3.91	0.50	0.37	1.71	2.21	1.96
20	4.76	4.62	3.61	0.52	0.35	2.01	2.07	1.77
40	5.02	4.35	6.30	0.47	0.33	3.42	3.33	3.11
60	3.70	3.78	4.22	0.38	0.62	3.61	3.23	3.33
80	2.21	2.18	2.43	0.47	0.34	1.45	1.12	1.00
100	2.69	2.46	2.32	0.45	0.58	2.36	2.41	2.57
120	0.72	0.67	0.66	0.34	0.33	0.43	0.38	0.38
140	0.34	0.30	0.37	0.34	0.34	0.28	0.35	0.24

BATS 70: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	370	93.17	44.38	5.81
150	371	98.74	22.24	2.77
150	372	113.87	26.29	4.17
200	373	95.56	51.66	8.84
200	374	139.35	33.62	6.20
200	375	85.20	19.30	3.71
300	376	72.46	11.04	0.93
300	377	85.20	16.38	2.31
300	378	74.85	12.79	1.58

BATS 71

Cruise Report

Cruise dates: August 15-19, 1994

Personnel: R. Kelly, A. Close, L. Caporelli, A. Doyle, K. Gundersen, M. Church, C. Hoffman, R. Bishop.

R/V Weatherbird II

15 August 1994

0710 - Depart BBSR.

1430 - Deploy PITs. Lat: 31.580 N; Long: 64.176 W

1448 - **CTD cast 1**, 500 m cast.
Lat: 31.571 N; Long: 64.182 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200, 250, 250, 250, 250, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 20, 40, 80, 100, 120, 140, and 160 m.

1612 - CTD cast 1 on deck. Lat: 31.575 N; Long: 64.197 W

1721 - BBOP cast. Lat: 31.672 N; Long: 64.171 W

1754 - **CTD cast 2**, 4200 m cast.
Lat: 31.678 N; Long: 64.177 W
Rosette malfunction. Bottles firing randomly.
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000 m.

Samples taken:

dissolved O_2 - replicates	23 depths
salinity	23 depths
NO_3, PO_4, SiO_4	23 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 1400, 2000, 2600, 3400 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3400, 3800, and 4000 m.

2150 - CTD cast 2 on deck. Lat: 31.685 N; Long: 64.207 W

2230 - BBOP cast. Lat: 31.667 N; Long: 64.167 W

2250 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.670 N; Long: 64.171 W

2327 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.678 N; Long: 64.177 W

16 August 1994

0017 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 31.688 N; Long: 64.181 W

0231 - BBOP cast. Lat: 31.670 N; Long: 64.169 W

0249 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 31.678 N; Long: 64.171 W

0323 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 31.686 N; Long: 64.167 W

0419 - **GoFlo cast #2**, 140 m.
Lat: 31.689 N; Long: 64.167 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths
chl *a* (BBOP)	8 depths

0603 - Deploy primary production array.
Lat: 31.669 N; Long: 64.167 W

0628 - BBOP cast. Lat: 31.674 N; Long: 64.171 W

0646 - **CTD cast 3**, 500 m cast.
Lat: 31.672 N; Long: 64.167 W
Nominal depths: 1, 1, 10, 10, 20, 20,40, 40, 60, 60, 80, 80, 100, 100, 120, 120, 140, 140, 160, 160, 200, 200, 250, 400 m.

Samples taken:

acantharia (Michaels)	top 10 depths
dissolved I (Jickells)	top 12 depths
particulate I (Jickells)	top 11 depths

0750 - CTD cast 3 on deck. Lat: 31.681 N; Long: 64.169 W

0814 - BBOP cast. Lat: 31.683 N; Long: 64.167 W

0912 - BBOP cast. Lat: 31.685 N; Long: 64.172 W

0956- Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.674 N; Long: 64.167 W

1000 - Begin Wakeham pumping.

1029 - Zooplankton tow (Madin), 0-200 m (200 µm net). Lat: 31.678 N; Long: 64.170 W

1122 - BBOP cast. Lat: 31.680 N; Long: 64.176 W

1203 - **CTD cast 4**, 500 m cast.
Lat: 31.683 N; Long: 64.184 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
DOC	12 depths
DON	12 depths
DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
POC/PON	12 depths
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths
chl *a* (BBOP)	12 depths

1306 - CTD cast 4 on deck. Lat: 31.688 N; Long: 64.200 W

1310 - End Wakeham pumping.

1338 - BBOP cast. Lat: 31.688 N; Long: 64.208 W

1510 - BBOP cast. Lat: 31.705 N; Long: 64.228 W

1613 - BBOP cast. Lat: 31.717 N; Long: 64.239 W

1652 - **CTD cast 5**, 500 m. Lat: 31.686 N; Long: 64.203 W
Calibration cast. No bottles fired.

1715 - CTD cast 5 on deck. Lat: 31.689 N; Long: 64.203 W

1717 - **CTD cast 6**, 500 m cast.
Lat: 31.689 N; Long: 64.203 W
Nominal depths: 1, 1, 1, 10, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,160, 200, 200, 250, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
ACDOM (Nelson)	1, 10, 20, 40, 60, 80, 100, 120, 150, 160, 200, and 250 m.
AP (Nelson)	1, 20, 40, 60, 80, and 100 m.
HPLC	1, 20, 40, 60, 80, and 100 m.
Elzone (BBOP)	1, 10, 20, 40, 60, 80, 100 and 120 m.

1833 - CTD cast 6 on deck. Lat: 31.697 N; Long: 64.208 W

1851 - BBOP cast. Lat: 31.697 N; Long: 64.210 W

1939 - BBOP cast. Lat: 31.696 N; Long: 64.211 W

2030 - Recover primary production array.
Lat: 31.690 N; Long: 64.218 W

2101 - BBOP cast. Lat: 31.691 N; Long: 64.214 W

17August 1994

0130 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 32.164 N; Long: 64.505 W

0209 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 32.177 N; Long: 64.512 W

0248 - Zooplankton tow (Bishop), 0-200 m (335 µm net). Lat: 32.017 N; Long: 64.522 W

0345 - **CTD cast 7**, 250 m cast.
Lat: 32.165 N; Long: 64.503 W
Nominal depths: 1, 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 15, 20, 30, 40, 60, 80, 100, 120, 140, 140 m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths

0450 - CTD cast 7 on deck. Lat: 32.170 N; Long: 64.515 W

0455 - Depart for BBSR.

18 August 1994

0730 - Depart BBSR. Personnel: R. Kelly, L. Caporelli, K. Gundersen, C. Hoffman, J. Marshall, D. Dietz, J. Hallinan.

1004 - **HS 773 CTD cast,** 2600 m.
Lat: 32.166 N; Long: 64.500 W

1328 - HS 773 CTD cast on deck. Lat: 32.170 N; Long: 64.491 W

1730 - BBOP cast. Lat: 31.754 N; Long: 64.166 W

1805 - Depart for PITS location.

1955 - Arrive at PITS. Lat: 31.675 N; Long: 64.477 W

2043 - **CTD cast 8**, 500 m cast.
Lat: 31.670 N; Long: 64.482 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150,150, 150, 150, 150, 150,150,150,150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 20, 40, 60, 80, 100, 120, 140, and 160 m.
EPA (Gundersen)	1, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 and 300 m.
^{3}H-leucine (Gundersen)	1, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 and 300 m.

2219 - CTD cast 8 on deck. Lat: 31.667 N; Long: 64.490 W

2235 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.663 N; Long: 64.824 W

2252 - Zooplankton tow (BATS), 0-100 m (335 µm net). Lat: 31.665 N; Long: 64.495 W

2315 - Zooplankton tow (Taylor), 0-100 m (20 µm net). Lat: 31.668 N; Long: 64.502 W

19 August 1994

0028 - Acoustic profile begins (BioSonics/MIT)

0557 - **CTD cast 9**, 500 m cast.
Lat: 31.677 N; Long: 64.516 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200, 200, 200, 200, 200, 200 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	top 12 depths

0730 - CTD cast 9 on deck. Lat: 31.685 N; Long: 64.518 W

0747 - Recover PITs. Lat: 31.683 N; Long: 64.531 W

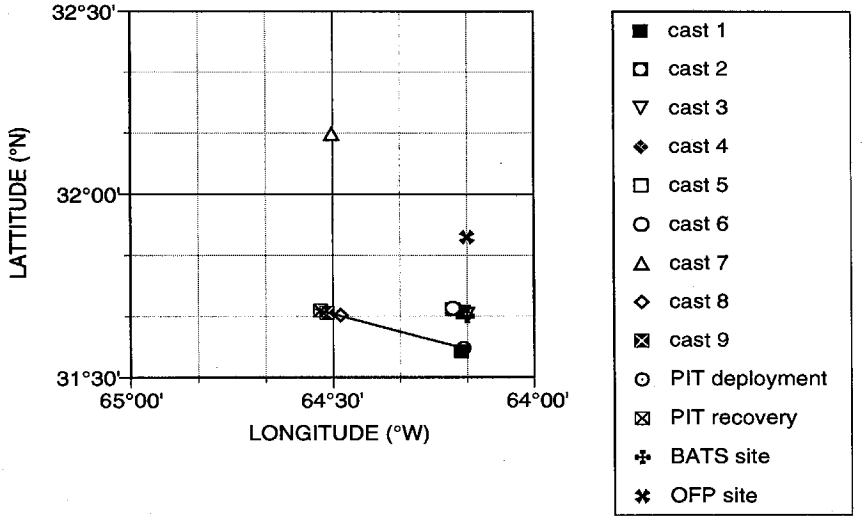
0800 - Depart for BBSR.

1201 - Plankton tow (Elardo), surface (335 µm net).

1217 - Plankton tow (Elardo), surface (335 µm net).

1430 - Arrive BBSR.

Cast positions: BATS 71

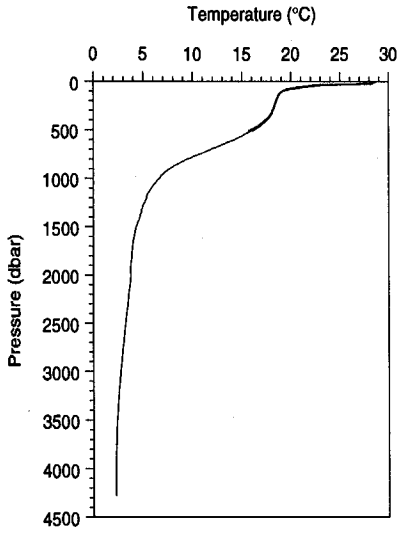


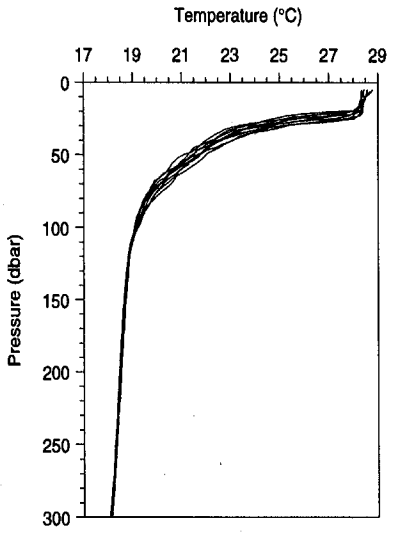
BATS 71, CTD Cast 2
August 15, 1994
Start cast: time: 1754 lat: 31.678 N long: 64.177 W
End cast: time: 2150 lat: 31.685 N long: 64.207 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
5.0	5.0	28.585	28.584	36.527	23.353	199.31	10.97	0.479	
10.0	10.1	28.471	28.468	36.522	23.387	199.56	10.88	0.482	
20.0	20.1	27.854	27.849	36.476	23.557	201.25	10.69	0.483	
30.0	30.2	24.357	24.351	36.541	24.706	209.95	8.43	0.488	
40.0	40.3	22.317	22.309	36.611	25.357	215.63	7.16	0.499	
50.0	50.4	21.437	21.427	36.609	25.603	218.46	6.78	0.503	
60.0	60.4	20.593	20.582	36.604	25.831	220.62	5.77	0.504	
70.0	70.5	20.142	20.129	36.604	25.953	220.16	3.59	0.499	
80.0	80.6	19.662	19.647	36.599	26.077	217.84	-0.62	0.491	
90.0	90.6	19.363	19.346	36.593	26.151	215.89	-3.76	0.485	
100.0	100.7	19.100	19.082	36.591	26.218	212.95	-7.75	0.478	
110.0	110.8	18.930	18.910	36.585	26.258	207.91	-13.49	0.476	
120.0	120.9	18.824	18.802	36.585	26.285	205.49	-16.34	0.470	
130.0	131.0	18.743	18.720	36.584	26.305	204.64	-17.52	0.459	
140.0	141.0	18.690	18.665	36.583	26.319	204.58	-17.79	0.454	
150.0	151.1	18.644	18.618	36.581	26.329	204.71	-17.85	0.449	
160.0	161.2	18.601	18.572	36.578	26.339	204.09	-18.65	0.448	
170.0	171.3	18.568	18.538	36.577	26.346	203.12	-19.76	0.444	
180.0	181.3	18.540	18.508	36.575	26.352	203.19	-19.81	0.441	
190.0	191.4	18.504	18.470	36.572	26.360	203.54	-19.61	0.437	
200.0	201.5	18.471	18.435	36.571	26.368	203.68	-19.60	0.436	
210.0	211.6	18.423	18.385	36.566	26.376	203.77	-19.72	0.434	
220.0	221.7	18.403	18.364	36.564	26.381	203.93	-19.65	0.433	
230.0	231.7	18.378	18.337	36.565	26.388	202.39	-21.29	0.432	
240.0	241.8	18.337	18.295	36.559	26.394	202.00	-21.86	0.431	
250.0	251.9	18.312	18.267	36.557	26.400	201.16	-22.81	0.430	
275.0	277.1	18.214	18.166	36.547	26.418	198.05	-26.34	0.427	
300.0	302.3	18.087	18.035	36.530	26.437	197.24	-27.70	0.426	
325.0	327.5	17.971	17.914	36.514	26.454	196.96	-28.50	0.423	
350.0	352.7	17.839	17.778	36.493	26.472	195.49	-30.55	0.422	
375.0	378.0	17.699	17.634	36.469	26.489	194.07	-32.61	0.420	
400.0	403.2	17.481	17.413	36.428	26.512	191.51	-36.16	0.418	
425.0	428.4	17.198	17.126	36.375	26.541	187.61	-41.36	0.415	
450.0	453.6	16.744	16.669	36.293	26.587	183.44	-47.65	0.414	
475.0	478.9	16.395	16.317	36.233	26.624	180.12	-52.62	0.413	
500.0	504.1	15.978	15.897	36.160	26.665	175.88	-58.86	0.413	
550.0	554.6	15.084	14.998	36.012	26.754	172.84	-66.28	0.410	
600.0	605.1	14.032	13.942	35.842	26.851	166.35	-78.12	0.406	
650.0	655.6	12.872	12.780	35.669	26.956	156.65	-93.95	0.405	
700.0	706.1	11.697	11.604	35.505	27.057	153.66	-103.43	0.404	
750.0	756.6	10.507	10.414	35.358	27.160	153.93	-110.02	0.401	
800.0	807.2	9.306	9.213	35.234	27.267	153.44	-117.74	0.400	
850.0	857.7	8.383	8.290	35.161	27.356	163.41	-113.53	0.399	
900.0	908.3	7.519	7.426	35.124	27.456	176.30	-106.16	0.396	
950.0	958.9	6.977	6.882	35.124	27.533	188.09	-97.88	0.393	
1000.0	1009.4	6.528	6.432	35.124	27.594	198.53	-90.42	0.391	
1050.0	1060.0	6.108	6.009	35.115	27.643	208.28	-83.53	0.388	
1100.0	1110.7	5.747	5.646	35.105	27.681	216.89	-77.43	0.385	
1150.0	1161.3	5.444	5.341	35.089	27.705	223.92	-72.55	0.383	
1200.0	1211.9	5.298	5.192	35.090	27.724	228.60	-68.89	0.381	
1300.0	1313.2	4.905	4.792	35.061	27.748	238.56	-61.80	0.379	

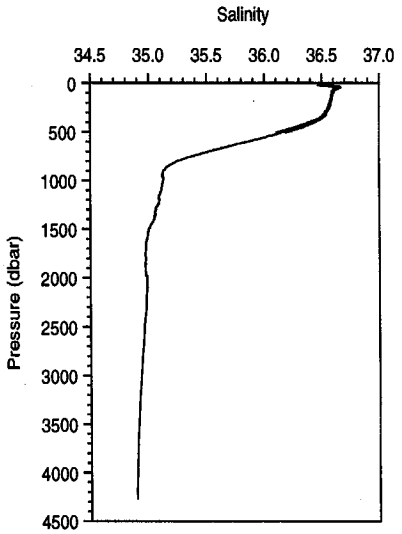
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	4.620	4.501	35.041	27.765	245.52	-56.95	0.378	
1500.0	1516.0	4.258	4.133	35.000	27.772	251.51	-53.72	0.378	
1600.0	1617.4	4.057	3.925	34.982	27.780	255.83	-50.94	0.375	
1700.0	1718.9	3.926	3.786	34.974	27.787	258.85	-48.92	0.374	
1800.0	1820.5	3.839	3.691	34.973	27.797	259.99	-48.44	0.372	
1900.0	1922.1	3.761	3.604	34.973	27.805	261.61	-47.41	0.372	
2000.0	2023.7	3.745	3.579	34.987	27.819	262.59	-46.51	0.370	
2100.0	2125.4	3.636	3.461	34.985	27.829	260.70	-49.24	0.370	
2200.0	2227.2	3.516	3.333	34.979	27.837	260.31	-50.56	0.369	
2300.0	2328.9	3.424	3.233	34.977	27.845	260.28	-51.29	0.368	
2400.0	2430.8	3.286	3.087	34.966	27.850	260.43	-52.24	0.368	
2500.0	2532.7	3.191	2.984	34.962	27.856	261.01	-52.40	0.367	
2600.0	2634.6	3.084	2.869	34.955	27.861	261.38	-52.89	0.367	
2700.0	2736.6	2.979	2.755	34.948	27.866	262.22	-52.89	0.366	
2800.0	2838.6	2.884	2.653	34.942	27.870	262.53	-53.33	0.366	
2900.0	2940.7	2.796	2.556	34.937	27.875	263.39	-53.18	0.366	
3000.0	3042.8	2.698	2.449	34.931	27.879	264.03	-53.33	0.365	
3100.0	3144.9	2.611	2.354	34.926	27.883	263.84	-54.23	0.364	
3200.0	3247.2	2.526	2.260	34.920	27.887	264.68	-54.09	0.365	
3300.0	3349.4	2.463	2.188	34.916	27.889	264.81	-54.47	0.364	
3400.0	3451.7	2.395	2.110	34.911	27.892	264.82	-55.02	0.364	
3500.0	3554.1	2.349	2.055	34.908	27.894	264.43	-55.79	0.364	
3600.0	3656.5	2.315	2.010	34.905	27.895	264.16	-56.34	0.364	
3700.0	3758.9	2.292	1.976	34.902	27.895	263.98	-56.71	0.364	
3800.0	3861.4	2.263	1.937	34.899	27.896	263.55	-57.38	0.365	
3900.0	3964.0	2.240	1.903	34.896	27.896	262.81	-58.32	0.366	
4000.0	4066.5	2.229	1.881	34.894	27.896	262.09	-59.14	0.367	
4100.0	4169.2	2.225	1.865	34.892	27.896	261.35	-59.91	0.368	
4200.0	4271.8	2.225	1.853	34.891	27.896	260.21	-61.06	0.370	

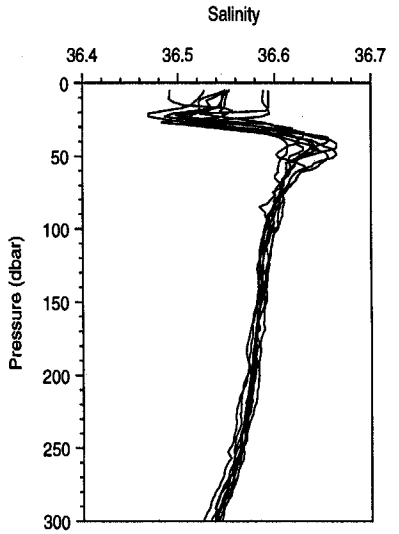
BATS 71—CTD Temperature Profiles



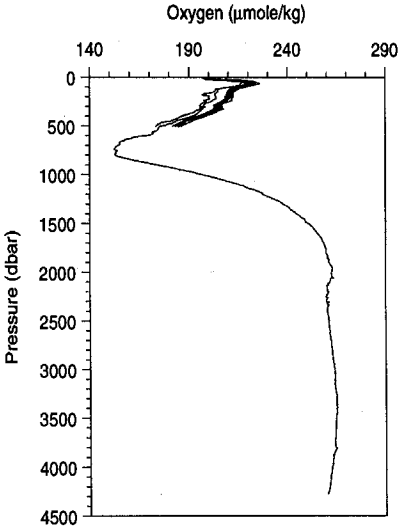


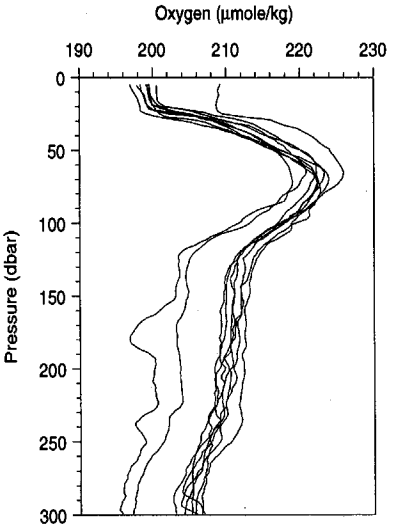
BATS 71—CTD Salinity Profiles



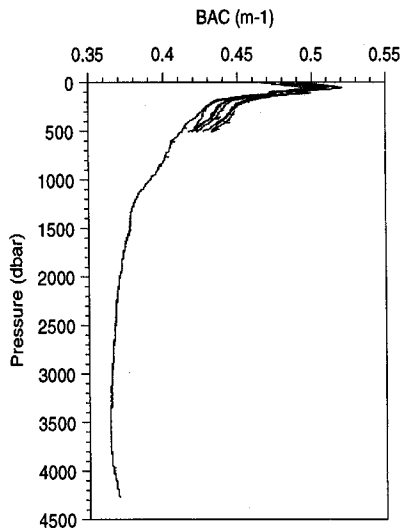


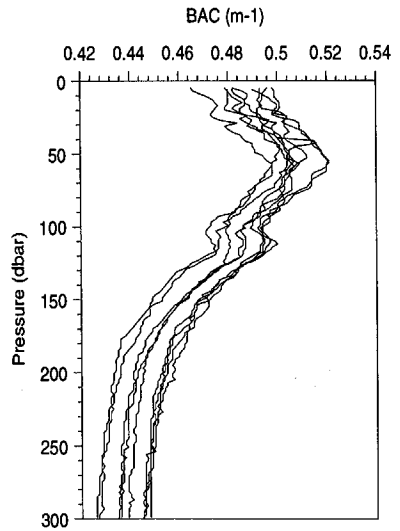
BATS 71—CTD Oxygen Profiles



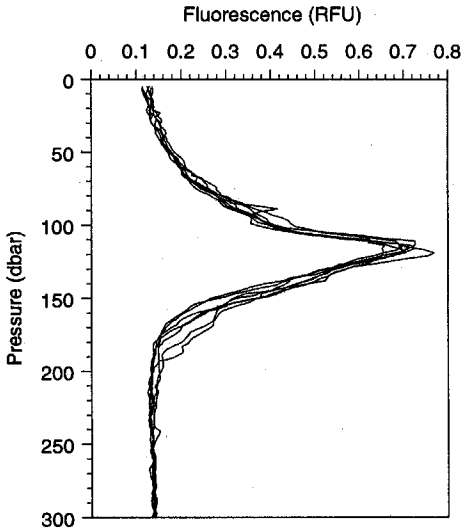


BATS 71—CTD BAC Profiles

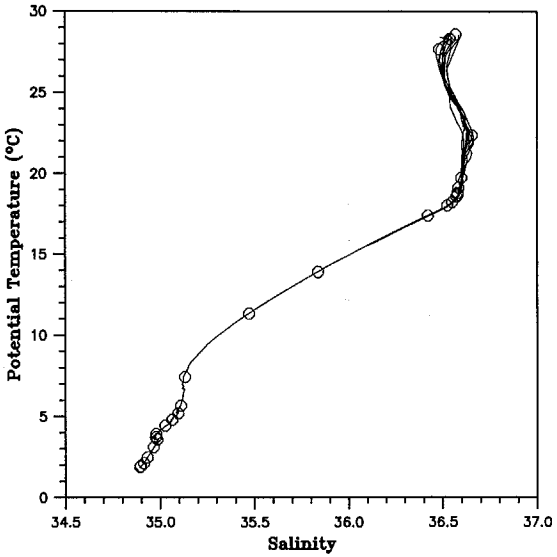




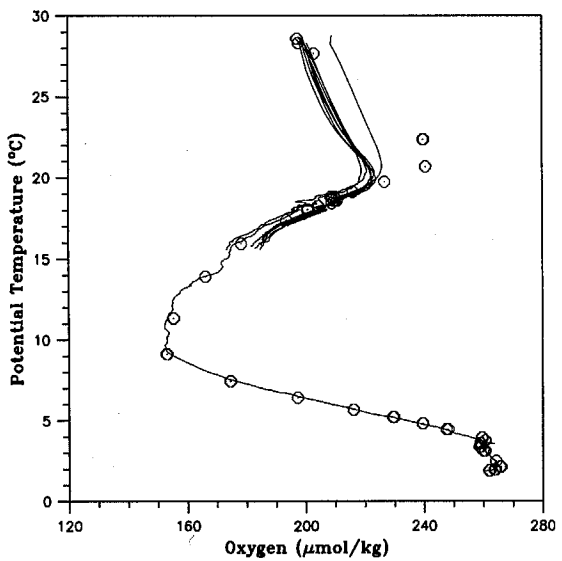
BATS 71—CTD Fluorescence Profile



BATS 71—T-S Diagram



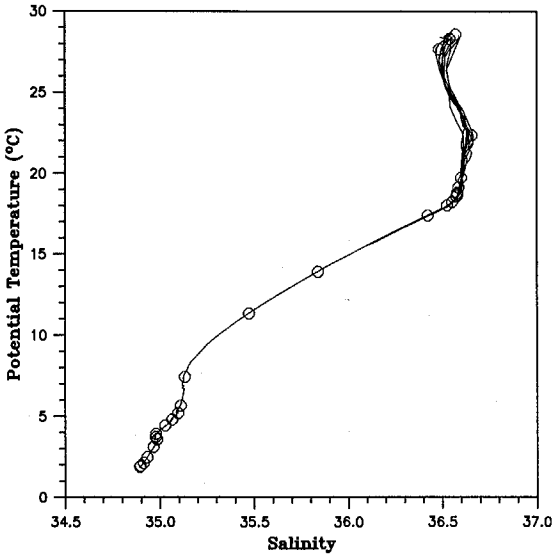
BATS 71—T-O Diagram



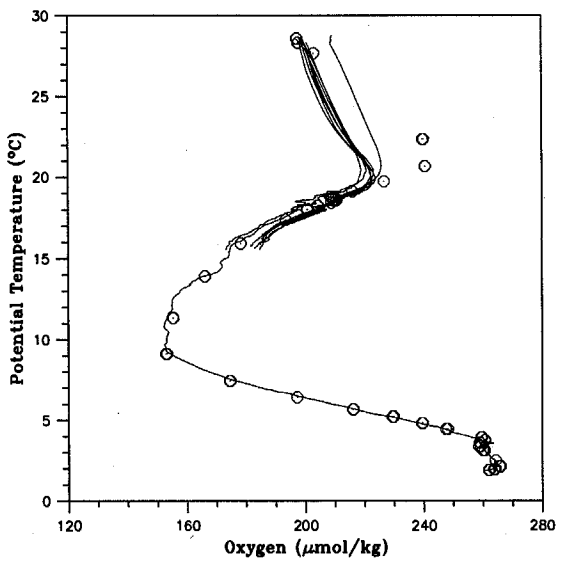
BATS 71—Bottle Data
August 15-19, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10710402	1.9	1.9	28.566	36.549	28.566		23.376
10710401	1.9	1.9	28.590	36.550	28.589	36.571	23.384
10710404	11.7	11.7	28.330	36.540	28.327		23.447
10710403	11.8	11.9	28.330	36.540	28.328	36.541	23.448
10710406	21.1	21.2	27.650	36.481	27.645		23.627
10710405	21.1	21.2	27.680	36.481	27.675	36.483	23.619
10710407	41.4	41.7	22.360	36.656	22.351	36.656	25.378
10710408	41.9	42.2	22.315	36.656	22.306		25.391
10710409	60.7	61.1	20.679	36.614	20.668		25.815
10710410	61.0	61.4	20.678	36.614	20.666		25.816
10710411	79.9	80.5	19.745	36.602	19.730	36.600	26.055
10710412	79.9	80.5	19.744	36.602	19.729		26.058
10710413	100.9	101.6	19.140	36.588	19.121	36.585	26.203
10710414	101.4	102.1	19.135	36.588	19.117		26.207
10710415	121.3	122.1	18.821	36.581	18.799	36.580	26.282
10710416	121.4	122.3	18.819	36.582	18.797		26.284
10710418	141.5	142.5	18.715	36.581	18.689		26.311
10710417	141.5	142.5	18.713	36.580	18.687	36.580	26.311
10710420	161.0	162.2	18.609	36.576	18.580		26.335
10710419	161.1	162.3	18.609	36.575	18.580	36.575	26.334
10710421	201.4	203.0	18.462	36.570	18.426		26.370
10710422	201.8	203.3	18.460	36.570	18.424		26.370
10710424	252.3	254.2	18.289	36.554	18.244		26.403
10710423	252.5	254.4	18.288	36.554	18.243	36.552	26.402
10710201	300.7	303.0	18.077	36.525	18.024	36.526	26.436
10710202	400.0	403.2	17.463	36.421	17.394	36.423	26.512
10710203	501.1	505.2	16.015	36.165	15.934		26.661
10710204	600.9	605.9	14.001	35.839	13.912	35.839	26.855
10710205	701.6	707.7	11.425	35.472	11.334	35.473	27.083
10710206	800.3	807.5	9.206	35.226	9.114		27.277
10710207	899.9	908.1	7.523	35.132	7.430	35.132	27.462
10710208	1002.3	1011.7	6.505	35.124	6.409		27.598
10710209	1100.8	1111.4	5.754	35.108	5.653	35.109	27.683
10710210	1200.9	1212.9	5.301	35.095	5.194	35.095	27.728
10710211	1301.8	1315.0	4.908	35.064	4.795	35.064	27.750
10710212	1402.3	1416.9	4.551	35.026	4.432	35.027	27.761
10710213	1598.7	1616.2	4.034	34.976	3.903	34.979	27.779
10710214	1801.9	1822.5	3.863	34.977	3.714	34.977	27.797
10710215	2001.7	2025.4	3.735	34.985	3.568	34.985	27.818
10710216	2201.0	2228.1	3.534	34.979	3.351		27.835
10710217	2400.8	2431.6	3.303	34.966	3.104	34.965	27.848
10710220	2998.2	3040.9	2.715	34.931	2.466	34.932	27.879
10710221	3399.6	3451.4	2.402	34.912	2.118	34.913	27.893
10710222	3800.3	3861.7	2.264	34.899	1.938	34.897	27.894
10710223	3999.9	4066.5	2.232	34.894	1.884	34.892	27.895

BATS 71—T-S Diagram



BATS 71—T-O Diagram



BATS 71—Bottle Data
August 15-19, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10710402	1.9	1.9	28.566	36.549	28.566		23.376
10710401	1.9	1.9	28.590	36.550	28.589	36.571	23.384
10710404	11.7	11.7	28.330	36.540	28.327		23.447
10710403	11.8	11.9	28.330	36.540	28.328	36.541	23.448
10710406	21.1	21.2	27.650	36.481	27.645		23.627
10710405	21.1	21.2	27.680	36.481	27.675	36.483	23.619
10710407	41.4	41.7	22.360	36.656	22.351	36.656	25.378
10710408	41.9	42.2	22.315	36.656	22.306		25.391
10710409	60.7	61.1	20.679	36.614	20.668		25.815
10710410	61.0	61.4	20.678	36.614	20.666		25.816
10710411	79.9	80.5	19.745	36.602	19.730	36.600	26.055
10710412	79.9	80.5	19.744	36.602	19.729		26.058
10710413	100.9	101.6	19.140	36.588	19.121	36.585	26.203
10710414	101.4	102.1	19.135	36.588	19.117		26.207
10710415	121.3	122.1	18.821	36.581	18.799	36.580	26.282
10710416	121.4	122.3	18.819	36.582	18.797		26.284
10710418	141.5	142.5	18.715	36.581	18.689		26.311
10710417	141.5	142.5	18.713	36.580	18.687	36.580	26.311
10710420	161.0	162.2	18.609	36.576	18.580		26.335
10710419	161.1	162.3	18.609	36.575	18.580	36.575	26.334
10710421	201.4	203.0	18.462	36.570	18.426		26.370
10710422	201.8	203.3	18.460	36.570	18.424		26.370
10710424	252.3	254.2	18.289	36.554	18.244		26.403
10710423	252.5	254.4	18.288	36.554	18.243	36.552	26.402
10710201	300.7	303.0	18.077	36.525	18.024	36.526	26.436
10710202	400.0	403.2	17.463	36.421	17.394	36.423	26.512
10710203	501.1	505.2	16.015	36.165	15.934		26.661
10710204	600.9	605.9	14.001	35.839	13.912	35.839	26.855
10710205	701.6	707.7	11.425	35.472	11.334	35.473	27.083
10710206	800.3	807.5	9.206	35.226	9.114		27.277
10710207	899.9	908.1	7.523	35.132	7.430	35.132	27.462
10710208	1002.3	1011.7	6.505	35.124	6.409		27.598
10710209	1100.8	1111.4	5.754	35.108	5.653	35.109	27.683
10710210	1200.9	1212.9	5.301	35.095	5.194	35.095	27.728
10710211	1301.8	1315.0	4.908	35.064	4.795	35.064	27.750
10710212	1402.3	1416.9	4.551	35.026	4.432	35.027	27.761
10710213	1598.7	1616.2	4.034	34.976	3.903	34.979	27.779
10710214	1801.9	1822.5	3.863	34.977	3.714	34.977	27.797
10710215	2001.7	2025.4	3.735	34.985	3.568	34.985	27.818
10710216	2201.0	2228.1	3.534	34.979	3.351		27.835
10710217	2400.8	2431.6	3.303	34.966	3.104	34.965	27.848
10710220	2998.2	3040.9	2.715	34.931	2.466	34.932	27.879
10710221	3399.6	3451.4	2.402	34.912	2.118	34.913	27.893
10710222	3800.3	3861.7	2.264	34.899	1.938	34.897	27.894
10710223	3999.9	4066.5	2.232	34.894	1.884	34.892	27.895

BATS 71—Bottle Data
August 15-19, 1994
Gases

Bottle ID	Depth	$O_2(1)$	$O_2(2)$	$O_2(1)$ anomaly	$O_2(2)$ anomaly	TCO_2
	(m)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)
10710401	1.9	197.31	197.44	9.02	9.15	2032
10710403	11.8	197.83	197.74	8.76	8.68	2033
10710405	21.1	203.12	203.08	12.05	12.00	2030
10710407	41.4	240.16	239.72	31.91	31.47	2043
10710409	60.7	240.75	240.62	26.24	26.11	2047
10710411	79.9	226.83		8.70		2060
10710413	100.9	216.15	216.06	-4.40	-4.48	2073
10710415	121.3	208.64	209.90	-13.20	-11.94	2078
10710417	141.5	209.29	209.16	-13.00	-13.13	2077
10710419	161.1	209.84	210.71	-12.88	-12.01	2078
10710421	201.4	209.00	208.91	-14.33	-14.41	2081
10710424	252.3	204.57	204.26	-19.50	-19.80	
10710423	252.5					2086
10710201	300.7	200.69	201.00	-24.30	-24.00	
10710202	400.0	193.60	193.56	-34.16	-34.20	
10710203	501.1	178.24	178.28	-56.32	-56.28	
10710204	600.9	166.21	166.08	-78.42	-78.55	
10710205	701.6	155.45	155.23	-103.18	-103.40	
10710206	800.3	153.23	152.88	-118.56	-118.91	
10710207	899.9	174.65	174.39	-107.76	-108.02	
10710208	1002.3	197.21	197.21	-91.89	-91.89	
10710209	1100.8	216.27	215.97	-77.99	-78.29	
10710210	1200.9	229.85	229.42	-67.61	-68.04	
10710211	1301.8	239.39	239.65	-60.94	-60.68	
10710212	1402.3	247.51	248.12	-55.50	-54.89	
10710213	1598.7	259.39	259.65	-47.56	-47.30	
10710214	1801.9	260.48	260.70	-47.76	-47.54	
10710215	2001.7	258.89	259.11	-50.30	-50.08	
10710216	2201.0	258.68	259.21	-52.05	-51.52	
10710217	2400.8	260.57	259.96	-51.97	-52.58	
10710220	2998.2	264.25	264.25	-52.99	-52.99	
10710221	3399.6	265.96	265.56	-53.82	-54.21	
10710222	3800.3	264.15	263.67	-56.78	-57.26	
10710223	3999.9	261.87	262.21	-59.34	-58.99	

BATS 71—Bottle Data
August 15-19, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10710401	1.9	0.00	0.00		1.0
10710403	11.8	0.00	0.00		0.9
10710405	21.1	0.00	0.00		0.9
10710407	41.4	0.00	0.00		0.9
10710409	60.7	0.00	0.00		1.0
10710411	79.9	0.00	0.00		1.0
10710413	100.9	0.00	0.00		1.2
10710415	121.3	0.81	0.05		1.2
10710417	141.5	1.35	0.00		1.3
10710419	161.1	2.05	0.00		1.3
10710421	201.4	2.41	0.00		1.4
10710423	252.5	3.15	0.00	0.17	1.5
10710201	300.7	3.96	0.00	0.25	1.7
10710202	400.0	5.68	0.00	0.31	2.4
10710203	501.1	9.49	0.00	0.64	3.9
10710204	600.9	13.22	0.00	0.94	6.6
10710205	701.6	18.79	0.00	1.29	10.4
10710206	800.3	22.29	0.00	1.48	14.1
10710207	899.9	20.61	0.00	1.34	15.0
10710208	1002.3	20.42	0.00	1.39	14.6
10710209	1100.8	18.56	0.00	1.45	14.2
10710210	1200.9	18.74	0.00	1.56	14.0
10710211	1301.8	18.23	0.00	1.24	13.8
10710212	1402.3	17.72	0.00	1.16	13.6
10710213	1598.7	17.01	0.00	1.21	13.5
10710214	1801.9	17.85	0.00	1.19	14.5
10710215	2001.7	18.19	0.00	1.14	16.3
10710216	2201.0	18.19	0.00	1.24	18.0
10710217	2400.8	18.32	0.00	1.27	19.9
10710220	2998.2		0.00	1.28	23.6
10710221	3399.6		0.00	1.26	27.3
10710222	3800.3		0.00	1.36	31.8
10710223	3999.9	18.70	0.00	1.37	34.6

BATS 71—Bottle Data
August 15-19, 1994
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10710402	1.9	18.31	3.00	3.45	0.047	
10710404	11.7	22.04	3.00	3.46	0.068	
10710406	21.1	25.31	4.11	4.89	0.074	
10710408	41.9	30.78	3.98	4.74	0.108	
10710410	61.0	28.50	3.98	7.92	0.173	
10710412	79.9	22.32	3.25	6.90	0.250	
10710414	101.4	18.32	3.31	5.16		
10710416	121.4	14.43	2.26	4.09		
10710418	141.5	10.43	1.87	2.95	0.186	
10710420	161.0	6.52	1.15	2.19	0.049	
10710422	201.8	5.12	1.01	2.13	0.004	
10710424	252.3	4.81	1.08	1.74	0.002	
10710201	300.7	6.08	0.75	1.50		
10710202	400.0	3.45	0.75	1.18		
10710203	501.1	3.99	0.69			
10710204	600.9	3.94	0.62			
10710205	701.6	3.89	0.75			
10710206	800.3	3.45	0.62			
10710207	899.9	3.50	0.69			
10710208	1002.3	3.50	0.75			
10710209	1100.8			0.48		
10710212	1402.3			0.30		
10710223	3999.9			0.25		

BATS 71—Bottle Data
August 15-19, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10710402	1.9	0	2	5	8	4	1	25	1
10710404	11.7	0	2	5	10	3	2	31	2
10710406	21.1	1	2	5	12	7	3	36	1
10710408	41.9	1	4	5	15	17	7	53	3
10710410	61.0	2	9	5	24	26	12	92	5
10710412	79.9	1	13	5	36	31	16	127	8
10710414	101.4	7	19	5	55	39	69	211	15
10710418	141.5	4	33	5	43	6	72	144	13
10710420	161.0	0	6	5	15	0	2	24	0
10710422	201.8	0	0	5	1	0	0	2	0
10710424	252.3	0	0	5	0	0	0	1	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10710402	1.9	0	0	0	0	5	0	4
10710404	11.7	0	0	0	0	7	0	2
10710406	21.1	0	0	0	0	6	0	2
10710408	41.9	0	0	0	0	5	0	0
10710410	61.0	0	3	4	1	6	1	0
10710412	79.9	0	3	10	1	5	2	0
10710414	101.4	0	5	6	2	3	2	0
10710418	141.5	0	8	5	2	3	2	0
10710420	161.0	0	0	0	0	1	0	0
10710422	201.8	0	0	0	0	0	0	0
10710424	252.3	0	0	0	0	0	0	0

BATS 71: Primary Production and Bacterial Thymidine Uptake

Collection	Primary Production					^{3}H-Thymidine Uptake		
Depth (m)	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	4.35	4.40	4.10	0.68	0.34	1.03	1.10	1.07
20	4.46	4.00	3.86	0.52	0.47	1.01	1.02	1.10
40	4.79	5.31	4.56	0.50	0.32	2.20	1.71	1.77
60	4.46	3.45	3.16	0.42	0.51	1.35	1.21	1.05
80	3.53	3.09	3.70	0.44	0.60	1.45	1.44	1.58
100	2.48	2.43	2.58	0.37	0.44	1.46	1.52	1.43
120	1.12	1.20	1.21	0.30	1.05	0.47	0.53	0.38
140	0.64	0.86	0.61	0.32	0.42	0.20	0.20	0.14

BATS 71: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	379	119.98	25.06	4.76
150	380	133.00	30.14	4.60
150	381	124.78	28.01	4.82
200	382	126.15	31.49	5.60
200	383	197.45	42.44	11.51
200	384	89.13	18.65	2.81
300	385	74.04	11.78	1.07
300	386	89.81	14.00	1.02
300	387	95.30	16.78	1.59

BATS 72

Cruise Report

Cruise dates: September 19-23, 1994

Personnel: F. Howse, L. Caporelli, R. Kelly, F. Bahr, R. Little, M. Church, R. François (WHOI), A. Fleer (WHOI).

R/V Weatherbird II

19 September 1994

0205 - Depart BBSR.

1458 - Deploy PITs. Lat: 31.589 N; Long: 64.182 W

1535 - BBOP cast. Lat: 31.593 N; Long: 64.174 W

1615 - **CTD cast 1**, 500 m cast.
Lat: 31.604 N; Long: 64.162 W
Nominal depths: 1, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 180, 200, 250, 250, 250, 250, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 m.

1729 - CTD cast 1 on deck. Lat: 31.618 N; Long: 64.145 W

1805 - Depart for BATS location.

1845 - Arrive at BATS

1857 - BBOP cast. Lat: 31.720 N; Long: 64.166 W

1855 - Surface seawater pumping (François)

1915 - **CTD cast 2**, 4200 m cast.
Lat: 31.675 N; Long: 64.167 W
Rosette malfunction. Bottles firing randomly.
Nominal depths: 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 3000, 3000, 3400, 3800, 4000, 4200 m.

Samples taken:

dissolved O_2 - replicates	24 depths
salinity	24 depths
NO_3, PO_4, SiO_4	24 depths
POC/PON	top 8 depths
DOC/DON	300, 400, 700, 800, 900, 1000, 1400, 2000, 2600, 3400 and 4000 m
PSi	top 8 depths
bacterial abundance	300, 400, 1100, 1400, 3000 and 4000 m
dissolved I (Jickells)	300, 400 and 500 m
total thorium (Buesseler)	3000, 3400, and 3800 m.
Ba & Sr (Francois)	24 depths

2308 - CTD cast 2 on deck. Lat: 31.713 N; Long: 64.152 W

2334 - BBOP cast. Lat: 31.710 N; Long: 64.157 W

20 September 1994

0004 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.701 N; Long: 64.154 W

0035 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.719 N; Long: 64.162 W

0120 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.723 N; Long: 64.145 W

0137 - Zooplankton tow (BATS), 0-100 m (335 μm net). Lat: 31.727 N; Long: 64.135 W

0207 - Zooplankton tow (Taylor), 0-100 m (20 μm net). Lat: 31.668 N; Long: 64.502 W

0258 - BBOP cast. Lat: 31.740 N; Long: 64.114 W

0500 - **GoFlo cast #1**, 140 m.
Lat: 31.666 N; Long: 64.166 W
Nominal depths: 1, 20, 40, 60, 80, 100, 120, 140 m.

Samples taken:

primary production	8 depths
^{3}H-thymidine uptake	8 depths
salinity	8 depths

0615 - Deploy primary production array.
Lat: 31.673 N; Long: 64.172 W

0651 - BBOP cast. Lat: 31.659 N; Long: 64.182 W

0708 - **CTD cast 3**, 500 m cast.
Lat: 31.661 N; Long: 64.184 W
Nominal depths: 1, 1, 10, 10, 20, 20, 40, 40, 60, 60, 80, 80, 100, 100, 120, 120. 140, 140, 160, 160, 200, 200, 250, 210 m.

Samples taken:

acantharia (Michaels)	top 10 depths
dissolved I (Jickells)	top 12 depths
particulate I (Jickells)	top 12 depths

0810 - CTD cast 3 on deck. Lat: 31.665 N; Long: 64.192 W

0856 - BBOP cast. Lat: 31.674 N; Long: 64.171 W

0910 - BBOP cast. Lat: 31.674 N; Long: 64.173 W

0949 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.672 N; Long: 64.180 W

1029 - Zooplankton tow (Madin), 0-200 m (200 μm net).
net malfunction no sample collected.

1108 - Zooplankton tow (Madin), 0-200 m (200 μm net). Lat: 31.674 N; Long: 64.195 W

1115 - Begin Wakeham pumping. Lat: 31.673 N; Long: 64.189 W

1152 - BBOP cast. Lat: 31.675 N; Long: 64.203 W

1243 - **CTD cast 4**, 500 m cast.
Lat: 31.677 N; Long: 64.217 W
Nominal depths: duplicates of 1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, 250 m.

Samples taken:

dissolved O_2 - replicates	12 depths
salinity	12 depths
NO_3, PO_4, SiO_4	12 depths
POC/PON	12 depths
DOC/DON	12 depths

DIC	12 depths; replicates at 1, 40 and 250 m
DIC (Keeling) - replicates	1 and 10 m
PSi	12 depths
chlorophyll *a*/HPLC	12 depths
bacterial abundance	12 depths
picoplankton (Olson)	12 depths
Ba and Sr (François)	12 depths

1341 - CTD cast 4 on deck. Lat: 31.678 N; Long: 64.229 W

1420 - BBOP cast. Lat: 31.677 N; Long: 64.231 W

1422 - End Wakeham pumping. Lat: 31.677 N; Long: 64.231 W

1435 - Zooplankton tow (François), surface (335 µm). Lat: 31.675 N; Long: 64.230 W

1618 - BBOP cast. Lat: 31.700 N; Long: 64.224 W

1640 - **CTD cast 5**, 500 m. Lat: 31.696 N; Long: 64.224 W
Calibration cast. No bottles fired.

1704 - CTD cast 5 on deck. Lat: 31.698 N; Long: 64.227 W

1705 - **CTD cast 6**, 500 m cast.
Lat: 31.698 N; Long: 64.227 W
Nominal depths: 1, 1, 10, 20, 20, 30, 40, 40, 50, 60, 60, 70, 80, 90, 100, 100, 110, 120, 130, 140, 150,160, 200, 250 m.

Samples taken:

total thorium (Buesseler)	top 16 depths
particulate thorium (Buesseler)	top 16 depths
chl *a* (BBOP)	1, 10, 20, 40, 60, 80, 100, 120, 140 and 160 m.
ACDOM (Nelson)	1, 10, 20, 40, 60, 80, 100, 120, 140, 160, 200, and 250 m.
AP (Nelson)	1, 20, 40, 60, 80, and 100 m.
Elzone (BBOP)	1, 10, 20, 20, and 40 m. (reps at 1, 20,40)

1820 - CTD cast 6 on deck. Lat: 31.699 N; Long: 64.237 W

1842 - BBOP cast. Lat: 31.250 N; Long: 64.238 W

1936 - BBOP cast. Lat: 31.732 N; Long: 64.235 W

2016 - Recover primary production array.
Lat: 31.734 N; Long: 64.243 W

2036 - BBOP cast. Lat: 31.736 N; Long: 64.242 W

2048 - **CTD cast 7**, 1500 m cast.
Lat: 31.740 N; Long: 64.240 W
Nominal depths: 1, 20, 50, 100, 200, 300, 500, 700, 900, 1100, 1300, 1500 m.
Samples taken:

Ba and Sr (François)	12 depths

2231 - CTD cast 7 on deck. Lat: 31.750 N; Long: 64.254 W

2312 - Depart for Hydrostation S

21 September1994

0215 - Arrive at Hydrostation S

0229 - **HS 776 CTD cast,** 2600 m.
Lat: 32.169 N; Long: 64.499 W

0530 - Hydrostation S CTD cast on deck. Lat: 32.190 N; Long: 64.496 W

0720 - **CTD cast 8**, 250 m cast.

Lat: 32.174 N; Long: 64.496 W
Nominal depths: 1, 1, 5, 10, 10, 10, 10, 10, 10, 10, 10, 15, 20, 20, 30, 30, 40, 60, 80, 100, 120, 140, 150, 200 m.

Samples taken:

DMS (Dacey)	12 depths
pDMSP (Dacey)	12 depths
sDMSP (Dacey)	12 depths
chl *a* (BBOP)	1, 10, 20, 40, 60, 80,100, 120, and 150 m.

0830 - CTD cast 7 on deck. Lat: 32.182 N; Long: 64.503 W

0849 - BBOP cast. Lat: 32.181 N; Long: 64.503 W

0855 - Depart for BBSR.

1120 - Arrive at BBSR

22 September 1994

0200- Depart BBSR in search of lost Sarcodine mooring.
Personnel: F. Howse, A. Doyle, F. Bahr, P. Countway, M. Ackley.

1200 - Winds picking up to 20 -25 knots. Steam towards Altomoor.

1348 - BBOP cast. Lat: 31.785 N; Long: 64.209 W

1620 - Depart for PITS location.

2015 - Recover PITs. Lat: 31.936 N; Long: 64.507 W

2125 - **CTD cast 9**, 500 m cast. (Buesseler)
Lat: 31.949 N; Long: 64.511 W
Nominal depths: 1, replicates at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 m.

Samples taken:

total thorium (Buesseler)	top 16 depths

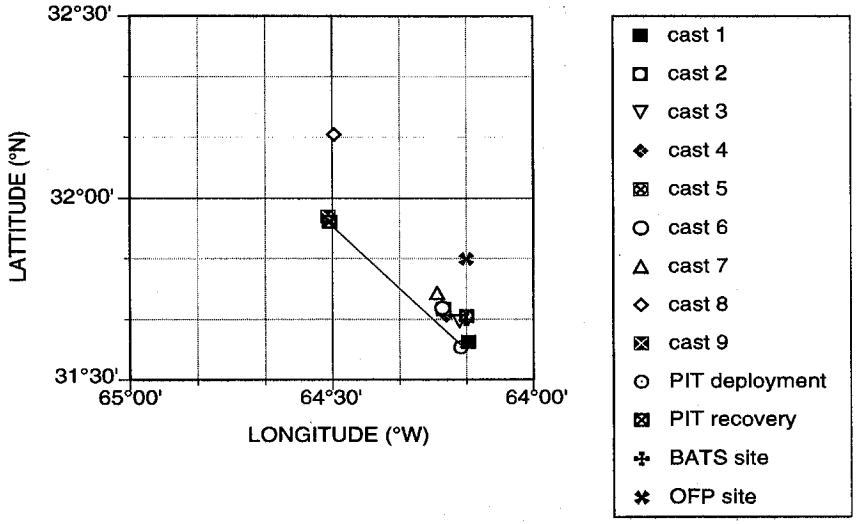
2240 - CTD cast 9 on deck. Lat: 31.965 N; Long: 64.514 W

23 September 1994

0040 - Depart for BBSR.

0410 - Arrive BBSR.

Cast positions: BATS 72

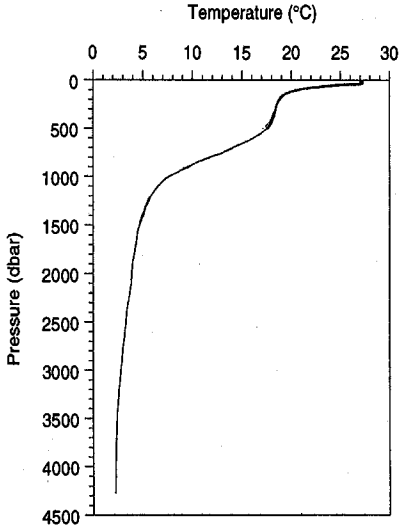


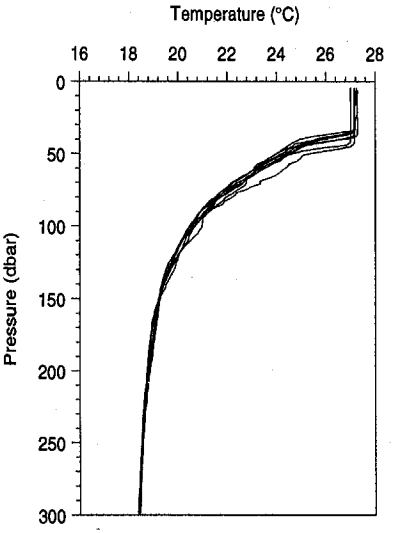
BATS 72, CTD Cast 2
September 19, 1994
Start cast: time: 1915 lat: 31.675 N long: 64.167 W
End cast: time: 2308 lat: 31.713 N long: 64.152 W

Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
5.0	5.0	27.251	27.249	36.402	23.696	200.52	8.04	0.482	
10.0	10.1	27.254	27.252	36.404	23.696	200.49	8.02	0.480	
20.0	20.1	27.257	27.253	36.404	23.696	200.62	8.16	0.481	
30.0	30.2	27.195	27.188	36.388	23.705	200.93	8.26	0.483	
40.0	40.3	25.672	25.663	36.435	24.223	209.77	12.41	0.494	
50.0	50.4	24.248	24.237	36.527	24.729	213.55	11.64	0.497	
60.0	60.4	23.216	23.203	36.608	25.096	214.51	9.20	0.499	
70.0	70.5	22.513	22.498	36.641	25.325	214.91	7.18	0.498	
80.0	80.6	21.701	21.685	36.658	25.569	215.18	4.55	0.495	
90.0	90.6	21.104	21.086	36.656	25.733	214.66	1.82	0.489	
100.0	100.7	20.592	20.572	36.652	25.870	212.66	-2.12	0.482	
110.0	110.8	20.158	20.137	36.645	25.982	207.45	-9.00	0.483	
120.0	120.9	19.879	19.856	36.631	26.046	209.64	-7.92	0.472	
130.0	131.0	19.637	19.613	36.616	26.099	210.71	-7.81	0.467	
140.0	141.0	19.402	19.376	36.607	26.154	209.61	-9.86	0.461	
150.0	151.1	19.267	19.239	36.601	26.184	208.80	-11.22	0.455	
160.0	161.2	19.186	19.157	36.600	26.205	207.89	-12.46	0.453	
170.0	171.3	19.085	19.054	36.600	26.232	207.15	-13.59	0.450	
180.0	181.3	18.976	18.944	36.596	26.258	206.54	-14.65	0.446	
190.0	191.4	18.895	18.860	36.594	26.277	207.11	-14.41	0.444	
200.0	201.5	18.819	18.783	36.591	26.295	207.18	-14.66	0.442	
210.0	211.6	18.744	18.707	36.586	26.310	208.54	-13.61	0.441	
220.0	221.7	18.685	18.645	36.583	26.323	208.83	-13.56	0.440	
230.0	231.7	18.633	18.592	36.580	26.335	209.62	-12.99	0.439	
240.0	241.8	18.602	18.559	36.578	26.342	209.82	-12.92	0.437	
250.0	251.9	18.569	18.524	36.575	26.349	209.97	-12.91	0.437	
275.0	277.1	18.496	18.447	36.573	26.366	210.45	-12.74	0.435	
300.0	302.3	18.433	18.379	36.568	26.379	210.89	-12.56	0.433	
325.0	327.5	18.378	18.320	36.564	26.392	209.75	-13.93	0.430	
350.0	352.7	18.313	18.251	36.558	26.404	206.35	-17.61	0.428	
375.0	378.0	18.226	18.160	36.549	26.420	204.94	-19.40	0.427	
400.0	403.2	18.133	18.062	36.537	26.436	204.46	-20.28	0.427	
425.0	428.4	18.028	17.953	36.522	26.451	203.28	-21.92	0.426	
450.0	453.6	17.897	17.818	36.501	26.468	200.43	-25.35	0.424	
475.0	478.9	17.751	17.668	36.473	26.484	197.58	-28.87	0.424	
500.0	504.1	17.494	17.408	36.426	26.512	193.58	-34.03	0.423	
550.0	554.6	16.857	16.765	36.310	26.577	183.68	-46.88	0.420	
600.0	605.1	16.011	15.914	36.163	26.664	179.55	-55.03	0.418	
650.0	655.6	15.030	14.928	36.000	26.760	176.29	-63.10	0.415	
700.0	706.1	13.928	13.824	35.823	26.861	169.05	-75.97	0.413	
750.0	756.6	12.988	12.881	35.683	26.947	160.48	-89.50	0.412	
800.0	807.2	11.558	11.452	35.490	27.074	159.86	-98.02	0.408	
850.0	857.7	10.326	10.221	35.339	27.179	156.90	-108.12	0.407	
900.0	908.3	9.219	9.115	35.229	27.279	159.27	-112.44	0.404	
950.0	958.9	8.402	8.297	35.171	27.363	166.35	-110.45	0.403	
1000.0	1009.4	7.502	7.398	35.135	27.469	181.60	-100.94	0.402	
1050.0	1060.0	6.901	6.796	35.122	27.544	193.48	-93.00	0.399	
1100.0	1110.7	6.444	6.337	35.118	27.602	204.14	-85.39	0.396	
1150.0	1161.3	6.076	5.967	35.113	27.647	212.75	-79.28	0.397	
1200.0	1211.9	5.755	5.644	35.108	27.683	220.78	-73.47	0.397	
1300.0	1313.2	5.270	5.153	35.082	27.722	232.73	-64.98	0.385	

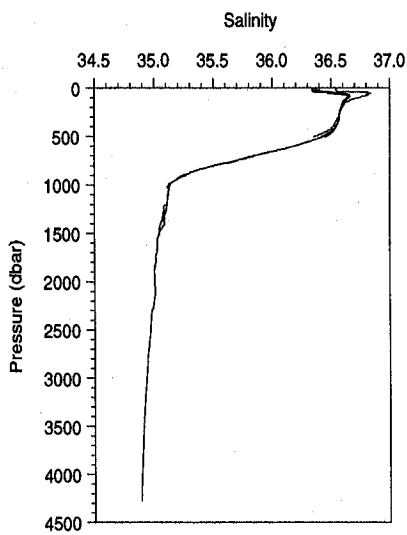
Depth (m)	Pres (db)	Temp (°C)	Pot.T (°C)	CTD Sal	Sigma$_\theta$ (kg/m^3)	CTD 0_2 (µmole/kg)	0_2 Anom (µmole/kg)	BAC (m^{-1})	Fluor (RFU)
1400.0	1414.6	5.049	4.926	35.088	27.754	238.54	-60.72	0.380	
1500.0	1516.0	4.608	4.479	35.038	27.765	247.36	-55.20	0.378	
1600.0	1617.4	4.407	4.270	35.026	27.779	251.43	-52.64	0.375	
1700.0	1718.9	4.258	4.114	35.018	27.789	253.38	-51.80	0.374	
1800.0	1820.5	4.082	3.931	35.008	27.800	255.17	-51.34	0.373	
1900.0	1922.1	3.952	3.792	35.003	27.810	256.63	-50.88	0.373	
2000.0	2023.7	3.866	3.698	35.005	27.821	256.48	-51.66	0.372	
2100.0	2125.4	3.786	3.609	35.008	27.832	255.92	-52.82	0.371	
2200.0	2227.2	3.638	3.454	34.998	27.840	256.43	-53.45	0.369	
2300.0	2328.9	3.464	3.272	34.978	27.842	259.07	-52.19	0.369	
2400.0	2430.8	3.352	3.152	34.972	27.848	259.90	-52.24	0.369	
2500.0	2532.7	3.260	3.052	34.967	27.854	260.13	-52.73	0.368	
2600.0	2634.6	3.162	2.945	34.959	27.858	261.22	-52.43	0.367	
2700.0	2736.6	3.023	2.799	34.949	27.863	262.85	-51.90	0.367	
2800.0	2838.6	2.936	2.703	34.945	27.868	263.00	-52.46	0.366	
2900.0	2940.7	2.844	2.602	34.939	27.872	263.39	-52.80	0.366	
3000.0	3042.8	2.746	2.497	34.933	27.877	264.56	-52.41	0.366	
3100.0	3144.9	2.658	2.399	34.927	27.880	265.25	-52.45	0.365	
3200.0	3247.2	2.573	2.306	34.922	27.884	266.05	-52.33	0.365	
3300.0	3349.4	2.488	2.212	34.916	27.887	266.04	-53.04	0.365	
3400.0	3451.7	2.424	2.139	34.912	27.890	266.10	-53.51	0.365	
3500.0	3554.1	2.377	2.082	34.908	27.892	265.91	-54.08	0.365	
3600.0	3656.5	2.336	2.030	34.905	27.893	265.60	-54.73	0.365	
3700.0	3758.9	2.308	1.992	34.902	27.894	265.12	-55.44	0.365	
3800.0	3861.4	2.277	1.950	34.899	27.895	264.61	-56.22	0.365	
3900.0	3964.0	2.256	1.918	34.896	27.895	263.90	-57.11	0.366	
4000.0	4066.5	2.241	1.892	34.894	27.895	263.06	-58.07	0.367	
4100.0	4169.2	2.232	1.872	34.892	27.895	262.25	-58.96	0.368	
4200.0	4271.8	2.229	1.857	34.890	27.895	261.47	-59.77	0.371	

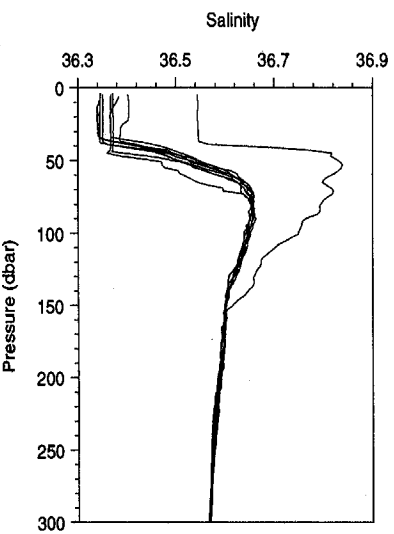
BATS 72—CTD Temperature Profiles



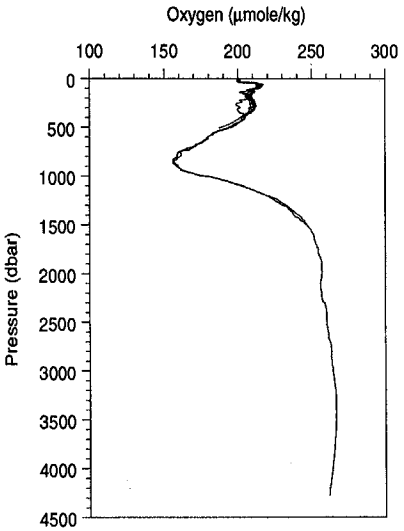


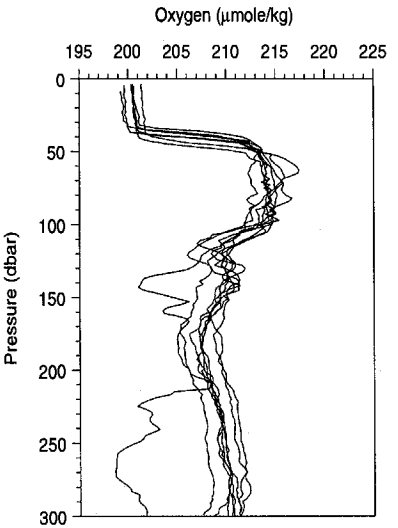
BATS 72—CTD Salinity Profiles



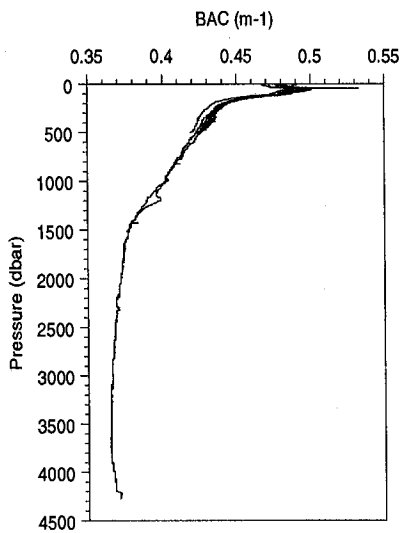


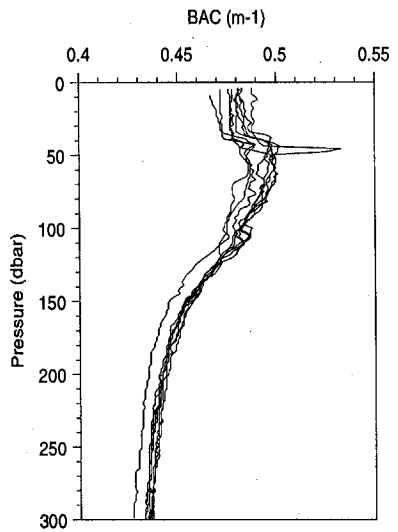
BATS 72—CTD Oxygen Profiles



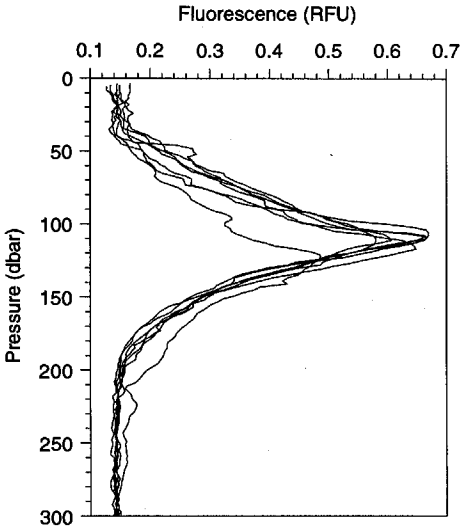


BATS 72—CTD BAC Profiles

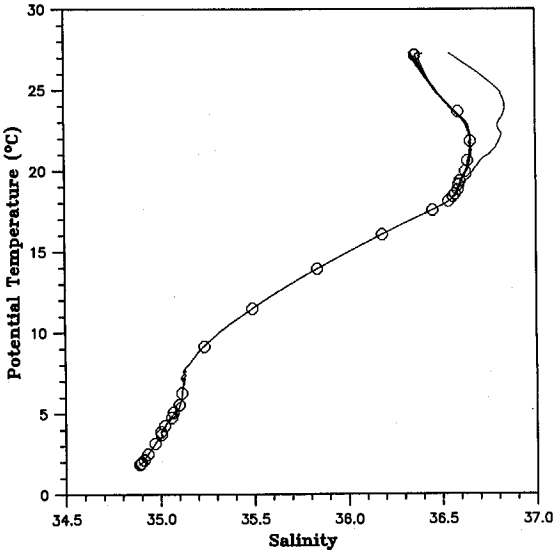




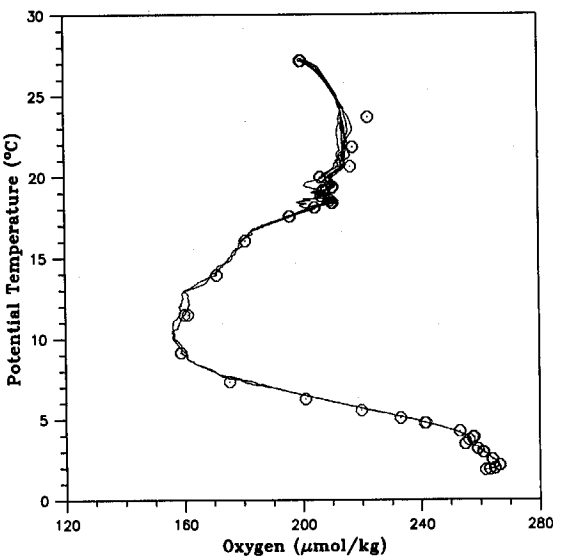
BATS 72—CTD Fluorescence Profile



BATS 72—T-S Diagram



BATS 72—T-O Diagram



BATS 72—Bottle Data
September 19-23, 1994
Physical Parameters

Bottle ID	Depth (m)	Pressure (db)	Temp (°C)	CTD Salt	Pot. Temp (°C)	Wet Salt	$Sigma_\theta$ (kg/m^3)
10710402	1.9	1.9	28.566	36.549	28.566		23.376
10710401	1.9	1.9	28.590	36.550	28.589	36.571	23.384
10710404	11.7	11.7	28.330	36.540	28.327		23.447
10710403	11.8	11.9	28.330	36.540	28.328	36.541	23.448
10710406	21.1	21.2	27.650	36.481	27.645		23.627
10710405	21.1	21.2	27.680	36.481	27.675	36.483	23.619
10710407	41.4	41.7	22.360	36.656	22.351	36.656	25.378
10710408	41.9	42.2	22.315	36.656	22.306		25.391
10710409	60.7	61.1	20.679	36.614	20.668		25.815
10710410	61.0	61.4	20.678	36.614	20.666		25.816
10710411	79.9	80.5	19.745	36.602	19.730	36.600	26.055
10710412	79.9	80.5	19.744	36.602	19.729		26.058
10710413	100.9	101.6	19.140	36.588	19.121	36.585	26.203
10710414	101.4	102.1	19.135	36.588	19.117		26.207
10710415	121.3	122.1	18.821	36.581	18.799	36.580	26.282
10710416	121.4	122.3	18.819	36.582	18.797		26.284
10710418	141.5	142.5	18.715	36.581	18.689		26.311
10710417	141.5	142.5	18.713	36.580	18.687	36.580	26.311
10710420	161.0	162.2	18.609	36.576	18.580		26.335
10710419	161.1	162.3	18.609	36.575	18.580	36.575	26.334
10710421	201.4	203.0	18.462	36.570	18.426		26.370
10710422	201.8	203.3	18.460	36.570	18.424		26.370
10710424	252.3	254.2	18.289	36.554	18.244		26.403
10710423	252.5	254.4	18.288	36.554	18.243	36.552	26.402
10710201	300.7	303.0	18.077	36.525	18.024	36.526	26.436
10710202	400.0	403.2	17.463	36.421	17.394	36.423	26.512
10710203	501.1	505.2	16.015	36.165	15.934		26.661
10710204	600.9	605.9	14.001	35.839	13.912	35.839	26.855
10710205	701.6	707.7	11.425	35.472	11.334	35.473	27.083
10710206	800.3	807.5	9.206	35.226	9.114		27.277
10710207	899.9	908.1	7.523	35.132	7.430	35.132	27.462
10710208	1002.3	1011.7	6.505	35.124	6.409		27.598
10710209	1100.8	1111.4	5.754	35.108	5.653	35.109	27.683
10710210	1200.9	1212.9	5.301	35.095	5.194	35.095	27.728
10710211	1301.8	1315.0	4.908	35.064	4.795	35.064	27.750
10710212	1402.3	1416.9	4.551	35.026	4.432	35.027	27.761
10710213	1598.7	1616.2	4.034	34.976	3.903	34.979	27.779
10710214	1801.9	1822.5	3.863	34.977	3.714	34.977	27.797
10710215	2001.7	2025.4	3.735	34.985	3.568	34.985	27.818
10710216	2201.0	2228.1	3.534	34.979	3.351		27.835
10710217	2400.8	2431.6	3.303	34.966	3.104	34.965	27.848
10710220	2998.2	3040.9	2.715	34.931	2.466	34.932	27.879
10710221	3399.6	3451.4	2.402	34.912	2.118	34.913	27.893
10710222	3800.3	3861.7	2.264	34.899	1.938	34.897	27.894
10710223	3999.9	4066.5	2.232	34.894	1.884	34.892	27.895

BATS 72—Bottle Data
September 19-23, 1994
Gases

Bottle ID	Depth	$O_2(1)$	$O_2(2)$	$O_2(1)$ anomaly	$O_2(2)$ anomaly	TCO_2
	(m)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)	(μmole/kg)
10710401	1.9	197.31	197.44	9.02	9.15	2032
10710403	11.8	197.83	197.74	8.76	8.68	2033
10710405	21.1	203.12	203.08	12.05	12.00	2030
10710407	41.4	240.16	239.72	31.91	31.47	2043
10710409	60.7	240.75	240.62	26.24	26.11	2047
10710411	79.9	226.83		8.70		2060
10710413	100.9	216.15	216.06	-4.40	-4.48	2073
10710415	121.3	208.64	209.90	-13.20	-11.94	2078
10710417	141.5	209.29	209.16	-13.00	-13.13	2077
10710419	161.1	209.84	210.71	-12.88	-12.01	2078
10710421	201.4	209.00	208.91	-14.33	-14.41	2081
10710424	252.3	204.57	204.26	-19.50	-19.80	
10710423	252.5					2086
10710201	300.7	200.69	201.00	-24.30	-24.00	
10710202	400.0	193.60	193.56	-34.16	-34.20	
10710203	501.1	178.24	178.28	-56.32	-56.28	
10710204	600.9	166.21	166.08	-78.42	-78.55	
10710205	701.6	155.45	155.23	-103.18	-103.40	
10710206	800.3	153.23	152.88	-118.56	-118.91	
10710207	899.9	174.65	174.39	-107.76	-108.02	
10710208	1002.3	197.21	197.21	-91.89	-91.89	
10710209	1100.8	216.27	215.97	-77.99	-78.29	
10710210	1200.9	229.85	229.42	-67.61	-68.04	
10710211	1301.8	239.39	239.65	-60.94	-60.68	
10710212	1402.3	247.51	248.12	-55.50	-54.89	
10710213	1598.7	259.39	259.65	-47.56	-47.30	
10710214	1801.9	260.48	260.70	-47.76	-47.54	
10710215	2001.7	258.89	259.11	-50.30	-50.08	
10710216	2201.0	258.68	259.21	-52.05	-51.52	
10710217	2400.8	260.57	259.96	-51.97	-52.58	
10710220	2998.2	264.25	264.25	-52.99	-52.99	
10710221	3399.6	265.96	265.56	-53.82	-54.21	
10710222	3800.3	264.15	263.67	-56.78	-57.26	
10710223	3999.9	261.87	262.21	-59.34	-58.99	

BATS 72—Bottle Data
September 19-23, 1994
Nutrients

Bottle ID	Depth (m)	Nitrate + Nitrite (µmole/kg)	Nitrite (µmole/kg)	Phosphate (µmole/kg)	Silicate (µmole/kg)
10710401	1.9	0.00	0.00		1.0
10710403	11.8	0.00	0.00		0.9
10710405	21.1	0.00	0.00		0.9
10710407	41.4	0.00	0.00		0.9
10710409	60.7	0.00	0.00		1.0
10710411	79.9	0.00	0.00		1.0
10710413	100.9	0.00	0.00		1.2
10710415	121.3	0.81	0.05		1.2
10710417	141.5	1.35	0.00		1.3
10710419	161.1	2.05	0.00		1.3
10710421	201.4	2.41	0.00		1.4
10710423	252.5	3.15	0.00	0.17	1.5
10710201	300.7	3.96	0.00	0.25	1.7
10710202	400.0	5.68	0.00	0.31	2.4
10710203	501.1	9.49	0.00	0.64	3.9
10710204	600.9	13.22	0.00	0.94	6.6
10710205	701.6	18.79	0.00	1.29	10.4
10710206	800.3	22.29	0.00	1.48	14.1
10710207	899.9	20.61	0.00	1.34	15.0
10710208	1002.3	20.42	0.00	1.39	14.6
10710209	1100.8	18.56	0.00	1.45	14.2
10710210	1200.9	18.74	0.00	1.56	14.0
10710211	1301.8	18.23	0.00	1.24	13.8
10710212	1402.3	17.72	0.00	1.16	13.6
10710213	1598.7	17.01	0.00	1.21	13.5
10710214	1801.9	17.85	0.00	1.19	14.5
10710215	2001.7	18.19	0.00	1.14	16.3
10710216	2201.0	18.19	0.00	1.24	18.0
10710217	2400.8	18.32	0.00	1.27	19.9
10710220	2998.2		0.00	1.28	23.6
10710221	3399.6		0.00	1.26	27.3
10710222	3800.3		0.00	1.36	31.8
10710223	3999.9	18.70	0.00	1.37	34.6

BATS 72—Bottle Data
September 19-23, 1994
Particulates, Bacterial Abundance, and Fluorometric Pigments

Bottle ID	Depth (m)	POC (µg/kg)	PON (µg/kg)	Bacteria (#x10^8/kg)	Chl *a* (µg/kg)	Phaeo (µg/kg)
10710402	1.9	18.31	3.00	3.45	0.047	
10710404	11.7	22.04	3.00	3.46	0.068	
10710406	21.1	25.31	4.11	4.89	0.074	
10710408	41.9	30.78	3.98	4.74	0.108	
10710410	61.0	28.50	3.98	7.92	0.173	
10710412	79.9	22.32	3.25	6.90	0.250	
10710414	101.4	18.32	3.31	5.16		
10710416	121.4	14.43	2.26	4.09		
10710418	141.5	10.43	1.87	2.95	0.186	
10710420	161.0	6.52	1.15	2.19	0.049	
10710422	201.8	5.12	1.01	2.13	0.004	
10710424	252.3	4.81	1.08	1.74	0.002	
10710201	300.7	6.08	0.75	1.50		
10710202	400.0	3.45	0.75	1.18		
10710203	501.1	3.99	0.69			
10710204	600.9	3.94	0.62			
10710205	701.6	3.89	0.75			
10710206	800.3	3.45	0.62			
10710207	899.9	3.50	0.69			
10710208	1002.3	3.50	0.75			
10710209	1100.8			0.48		
10710212	1402.3			0.30		
10710223	3999.9			0.25		

BATS 72—Bottle Data
September 19-23, 1994
HPLC Pigments

All concentrations in ng/kg:

Chl c	=	Chlorophyll c_1+c_2	Zea	=	Zeaxanthin
But	=	19'-Butanoyloxyfucoxanthin	Chl b	=	Chlorophyll *b*
Fuco	=	Fucoxanthin	Chl a	=	Chlorophyll *a*
Hex	=	19'-Hexanoyloxyfucoxanthin	Car	=	Total Carotene

Bottle ID	Depth	Chl c	But	Fuco	Hex	Zea	Chl b	Chl a	Car
10710402	1.9	0	2	5	8	4	1	25	1
10710404	11.7	0	2	5	10	3	2	31	2
10710406	21.1	1	2	5	12	7	3	36	1
10710408	41.9	1	4	5	15	17	7	53	3
10710410	61.0	2	9	5	24	26	12	92	5
10710412	79.9	1	13	5	36	31	16	127	8
10710414	101.4	7	19	5	55	39	69	211	15
10710418	141.5	4	33	5	43	6	72	144	13
10710420	161.0	0	6	5	15	0	2	24	0
10710422	201.8	0	0	5	1	0	0	2	0
10710424	252.3	0	0	5	0	0	0	1	0

C3	=	Chlorophyll c_3	Diad	=	Diadinoxanthin
Clid	=	Chlorophyllide *a*	Allo	=	Alloxanthin
Per	=	Peridinin	Diat	=	Diatoxanthin
Pras	=	Prasinoxanthin			

Bottle ID	Depth	C3	Clid	Per	Pras	Diad	Allo	Diat
10710402	1.9	0	0	0	0	5	0	4
10710404	11.7	0	0	0	0	7	0	2
10710406	21.1	0	0	0	0	6	0	2
10710408	41.9	0	0	0	0	5	0	0
10710410	61.0	0	3	4	1	6	1	0
10710412	79.9	0	3	10	1	5	2	0
10710414	101.4	0	5	6	2	3	2	0
10710418	141.5	0	8	5	2	3	2	0
10710420	161.0	0	0	0	0	1	0	0
10710422	201.8	0	0	0	0	0	0	0
10710424	252.3	0	0	0	0	0	0	0

BATS 72: Primary Production and Bacterial Thymidine Uptake

Collection	Primary Production					^{3}H-Thymidine Uptake		
Depth (m)	Light 1 (mg C/m^3/day)	Light 2 (mg C/m^3/day)	Light 3 (mg C/m^3/day)	Dark (mg C/m^3/day)	TØ (mg C/m^3/day)	1 (pmole/l/hour)	2 (pmole/l/hour)	3 (pmole/l/hour)
1	2.09	2.73	3.15	0.49	0.36	0.46	0.35	0.25
20	3.14	3.39	3.89	0.46	0.46	0.27	0.29	0.29
40	1.48	1.68	1.74	0.32	0.66			
60	3.34	3.64	3.16	0.52	0.58	1.69	1.71	1.63
80	2.41	2.60	2.42	0.38	0.47	1.67	1.85	2.00
100	1.42	1.26	1.23	0.31	0.58	0.95	0.91	0.95
120	0.93	0.95	0.90	0.54	0.69	0.24	0.20	0.19
140	0.39	0.37	0.39	0.31	0.64	0.22	0.22	0.22

BATS 72: Sediment Trap Estimated Particle Fluxes

Depth (m)	Sample #	Mass (mg/m^2/d)	Organic Carbon (mg C/m^2/d)	Nitrogen (mg N/m^2/d)
150	388	123.43	31.67	6.39
150	389	114.67	31.53	5.50
150	390	125.82	33.85	6.51
200	391	70.07	15.01	2.13
200	392	81.22	21.70	3.16
200	393	72.46	17.40	2.48
300	394	51.76	12.20	1.86
300	395	55.74	12.14	1.76
300	396	79.63	23.47	4.13