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GLOBAL CHANGE EXPEDITION: NUTRIENT, CHLOROPHYLL-A AND PRIMARY PRODUCTIVITY DATA NOAA SHIP MT. MITCHELL, 14 JULY - 6 SEPTEMBER 1988

Denis W. Frazel
Nova University Oceanographic Center
Dania, Florida

George A. Berberian
Gary L. Hitchcock
Ocean Chemistry Division

Atlantic Oceanographic and Meteorological Laboratory
Miami, Florida
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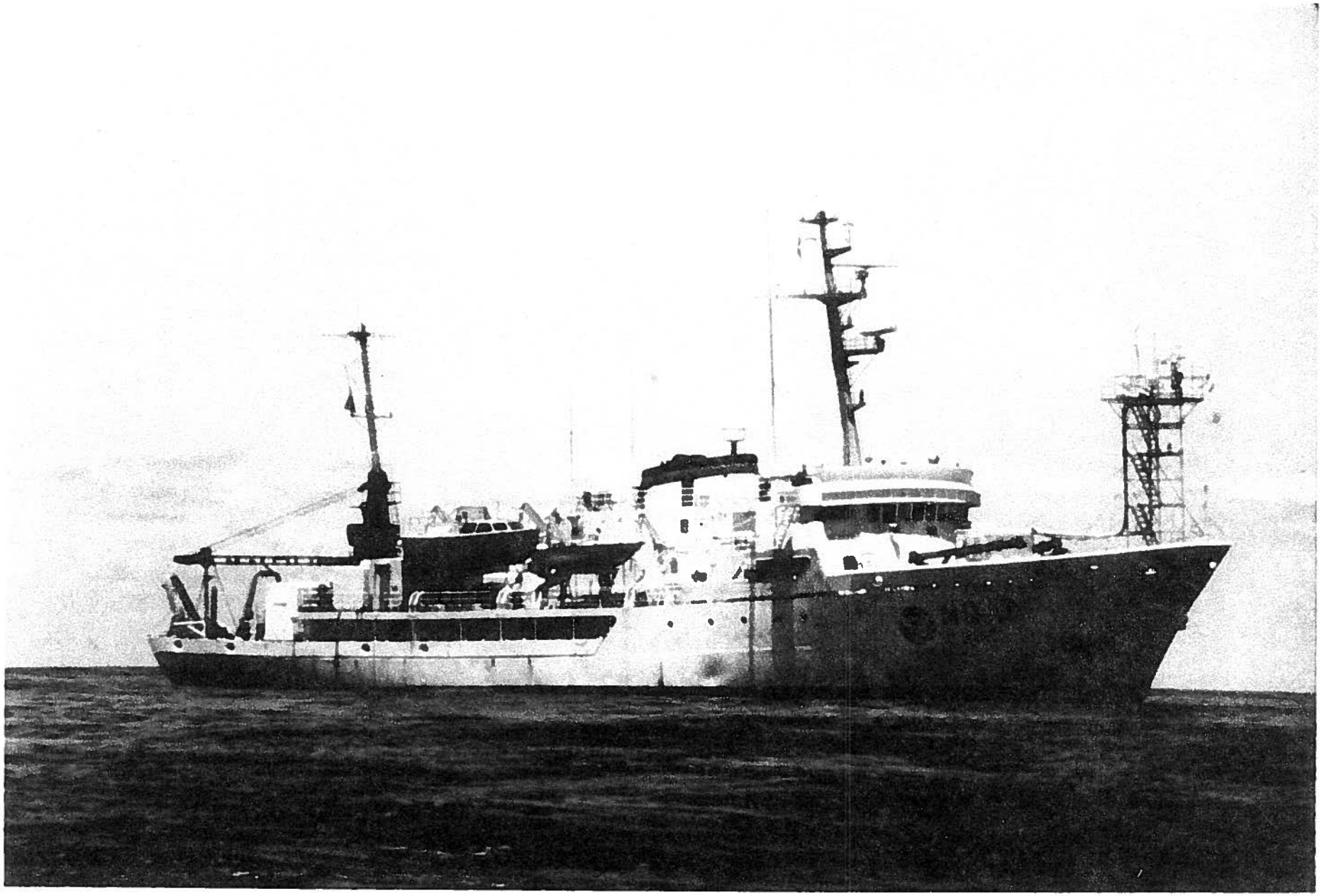

NOAA Ship MT. MITCHELL (S-222).

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During the period of 14 July-6 September 1988, a multifaceted oceanographic research cruise called the Global Change Expedition was made on the NOAA Ship MT. MITCHELL in the North Atlantic Ocean. The objective of the cruise was to study the atmospheric and oceanic processes affecting the biogeochemical cycles of carbon, nitrogen, sulfur, and trace metals. Emphasis was made on compounds of these elements that would influence the radiation balance of the earth, and hence, of global climate. Measurements from hydrocasts for nutrients, phytoplankton biomass, and productivity were made on a daily basis during this period. This report represents the biological and chemical (nutrient) data from this cruise.

Key words: global change, productivity data, nutrient data.

1. INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) Global Change Expedition (14 July-6 September 1988) was a multifaceted research program designed to study atmospheric and oceanic processes affecting the biogeochemical cycles of carbon, nitrogen, and sulfur. Emphasis was on compounds of these elements that may influence the radiation balance of the earch.

The expedition was conducted aboard the NOAA Ship MT. MITCHELL in four consecutive legs (Figure 1). The primary objective of Leg I (Norfolk, Virginia - Bermuda) was to examine the potential transport of carbon from nearshore shelf water into the Gulf Stream by means of tracking drogued surface drifters. Leg II (Bermuda - Iceland) was designed to support a survey of the tropospheric chemistry of the North Atlantic. The objective of Leg III (Iceland - Azores) was to occupy a specific meridional transect of stations along 20°W to provide a preliminary nutrient and productivity section for the Joint Global Ocean Flux Study (JGOFS). Leg IV (Azores - Barbados) was similar to Leg III, with nutrient and productivity sampling occurring at dawn each day.

This report contains consecutive hydrographic, nutrient, chlorophyll-a, and primary productivity data from the Global Change Expedition, corresponding to the CTD cast, date, and station position.

2. INSTRUMENTATION

A. CTD System

The conductivity, temperature and depth (CTD) system consisted of a Mark III CTD manufactured by EG&G Ocean Products (formerly Neil Brown Instrument Systems Corp.), a General Oceanics Corp. rosette water sampling system, and a Micro-VAX based shipboard data acquisition system. As the CTD is lowered from the ship, it continuously transmits conductivity, temperature

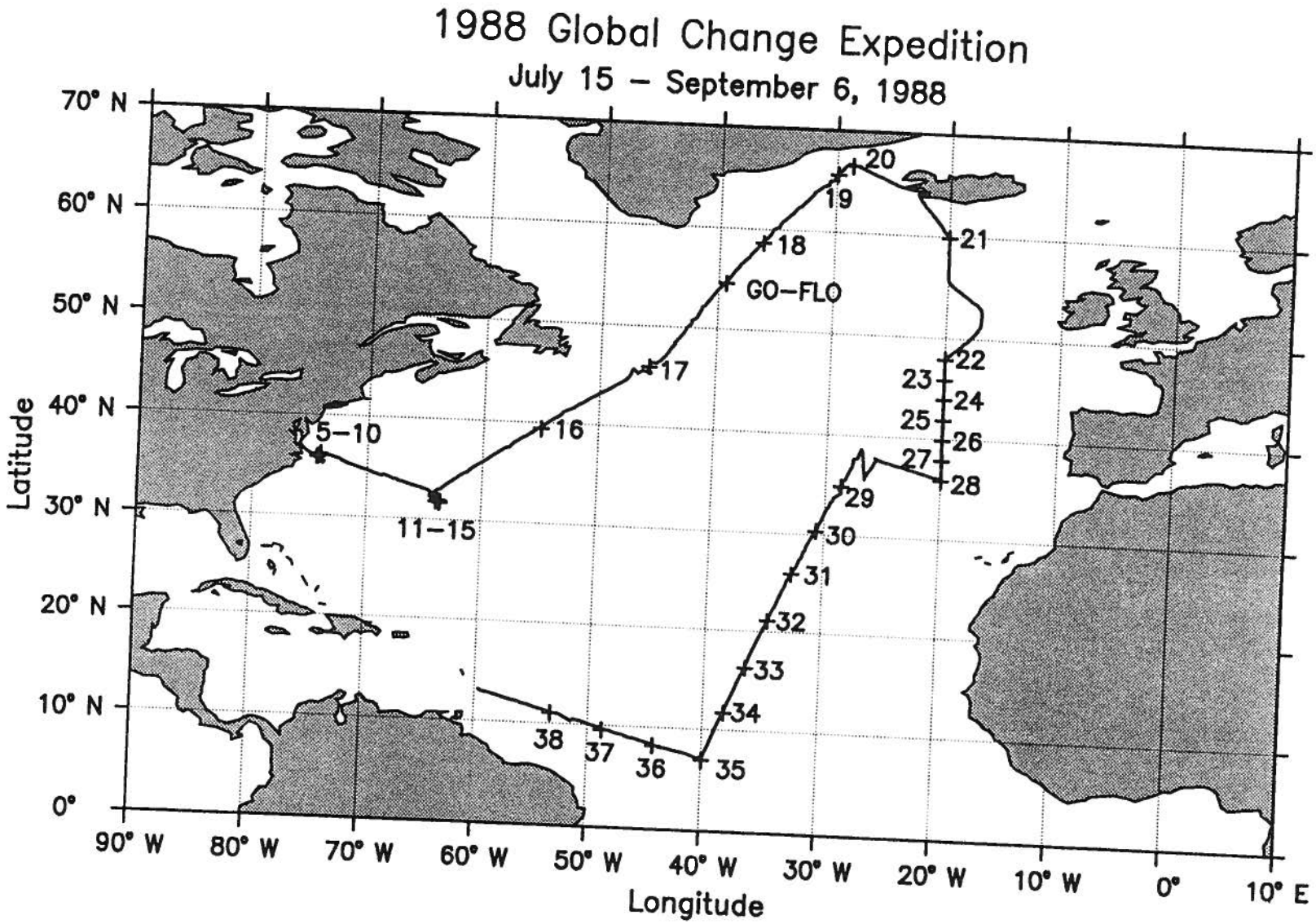

Figure 1. NOAA Ship MT. MITCHELL cruise track and CTD station locations.

and pressure data up the cable where it is logged on 9-track magnetic tape by the computer. Measurements of all parameters are made 31.5 times per second to a resolution of 16 bits. The dissolved oxygen sensor, which is usually installed, was not operable during this expedition. Table 1 summarizes the standard ranges and resolutions.

Table 1

Variable	Range	Accuracy	Resolution
Pressure	0-6500 decibar	6.5 decibar	.1 decibar
Temperature	-32 to +32°C	.005°C (-3 to +32)	.0005°C
Conductivity	0-65 mmho	.005 mmho	.001 mmho
Dissolved Oxygen	0-2	.002	.0005

Following the cast, computer programs are run to edit and remove any bad data points (Mangum et al., 1980), compensate for sensor response time lags (Horne and Toole, 1980), and condense the data into 1-m depth averages. Additional programs are then available to print our high-resolution data as necessary.

Physical oceanographic parameters such as pressure, conductivity and temperature data used in this report are taken directly from the CTD casts.

3. NUTRIENTS

A. Data Collection and Field Operations

Data from all four legs of this cruise are reported (Leg I: July 7-28, 1988; Leg II: August 2-10, 1988; Leg III: August 16-22, 1988; Leg IV: August 27-September 5, 1988). During each leg, except casts 1 through 3, pressure, temperature, and salinity were measured at each station by means of a Neil Brown Instrument Mark III CTD equipped with a rosette multi-sampler rigged with standard 2.8 l Niskin bottles. Casts 1-3 samples were obtained by oceanographic wire casts with 10 l Go-Flo Niskin bottles. Water samples with the rosette multi-sampler were collected at specified temperatures and depths chosen to sample maximum and minimum physical, chemical and biological properties of the water column. These were analyzed for salinity, dissolved oxygen, and inorganic nutrient concentrations. Seawater samples for dissolved oxygen were drawn first in order to minimize atmospheric contamination and temperature-induced changes.

These samples were collected in 250 ml amber bottles with ground glass stoppers and preserved with manganous sulfate and alkaline iodide reagents and were subsequently analyzed onboard ship using the modified Winkler titration method of Strickland and Parsons (1968). Nutrient samples were collected in aged 60 ml linear polyethylene bottles and analyzed for dissolved inorganic nitrate (NO_3^--N), nitrite (NO_2^--N), orthophosphate (PO_4^{-3}-P), and silicate (SiO_4^{-2}-Si), with a four-channel Technicon Auto-Analyzer (AA-II) aboard ship. During Legs III and IV, auto-analyzer phosphate analysis was discontinued due to a malfunctioning colorimeter, and we were forced to use manual spectrophotometry on a limited number of samples using the method of Strickland and Parsons (1968).

B. Nutrient Sample Analyses

The analytical procedures and methodologies used in the analysis of nitrate and nitrite are described by Armstrong et al. (1967). Essentially, the orthophosphate is the procedure described by Grasshoff (1965) and the silicate procedure is described by Strickland and Parsons (1968). These methodologies have been slightly modified by Technicon Corp. in order to adapt them properly to the auto-analyzer system used in these analyses as follows: nitrate and nitrite in water and seawater, Technicon Corporation (1977), nitrite in water and seawater, Technicon Corporation (1976), and silicates in water and seawater (1977).

The detection limits, standard deviation and coefficient of variation is given below in Table 2.

Table 2: Nutrient auto-analyzer performance characteristics.

Nutrient	Detection Limits (μg-at/L)	Standard Deviation (μg-at/L)	Coefficient of Variation (95% confidence level)
PO_4^{3-} -P	0.05	$\pm$0.06	1.9% at 2.0 μg-at/L
NO_3^- -N	0.4	$\pm$0.4	0.6% at 2.5 μg-at/L
NO_2^- -N	0.1	$\pm$0.05	0.95% at 1.0 μg-at/L
SiO_4^{2-} -S	0.4	$\pm$0.4	1.0% at 25.0 μg-at/L

C. Station Data

See the following pages for station data.

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 5 CAST: 1 DATE(Z): 07/19/88 TIME(Z): 00:00 POSITION: 35 55.1 N 74 40.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0001	75	5.31	0.10	1.80	0.68	999.99	5.11	12.03	35.207	CORRESPONDS TO CAST5
0002	60	5.74	0.11	1.64	0.70	999.99	5.08	12.46	35.183	CORRESPONDS TO CAST5
0003	50	6.88	0.14	2.20	0.70	999.99	3.84	17.06	36.004	CORRESPONDS TO CAST5

STATION: 5 CAST: 2 DATE(Z): 07/19/88 TIME(Z): 00:00 POSITION: 35 55.1 N 74 40.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0004	40	4.88	0.34	0.40	0.28	999.99	4.46	22.10	35.992	CORRESPONDS TO CAST5
0005	31	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.96	24.58	36.189	CORRESPONDS TO CAST5
0006	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.96	25.53	36.225	CORRESPONDS TO CAST5

STATION: 5 CAST: 3 DATE(Z): 07/19/88 TIME(Z): 00:00 POSITION: 35 55.1 N 74 40.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0007	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.83	26.09	34.542	CORRESPONDS TO CAST5
0008	7	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.85	26.15	34.476	CORRESPONDS TO CAST5
0009	1	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.82	30.11	39.470	CORRESPONDS TO CAST5

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 6 CAST: 6 DATE(Z): 07/19/88 TIME(Z): 00:00 POSITION: 35 54.6 N 74 35.3 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0010	1	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.87	26.61	34.452	
0011	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.84	26.47	34.545	
0012	14	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.90	26.21	34.956	
0013	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.88	25.93	35.584	
0014	44	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.14	21.93	36.081	
0015	54	2.09	0.35	0.66	0.19	999.99	4.72	18.78	35.989	
0016	65	5.54	0.15	2.25	0.79	999.99	3.82	16.46	36.021	
0017	76	6.59	< 0.10	2.41	0.88	999.99	4.55	14.39	35.597	
0018	90	6.77	< 0.10	2.17	0.87	999.99	4.91	12.39	35.395	

STATION: 7 CAST: 7 DATE(Z): 07/20/88 TIME(Z): 00:00 POSITION: 35 59.4 N 74 26.8 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0019	4	< 0.40	< 0.10	< 0.40	0.11	999.99	4.81	26.29	34.575	
0020	10	< 0.40	< 0.10	< 0.40	0.09	999.99	4.81	26.28	34.577	
0021	14	< 0.40	< 0.10	< 0.40	0.06	999.99	4.76	26.28	34.579	
0022	20	0.52	< 0.10	< 0.40	< 0.05	999.99	4.83	26.46	34.901	
0023	46	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.94	24.99	36.123	
0024	55	1.44	0.19	0.20	0.06	999.99	4.87	23.02	36.090	
0025	65	5.34	0.41	1.06	0.32	999.99	4.43	19.23	36.007	
0026	75	6.22	0.18	1.74	0.53	999.99	4.01	17.68	36.056	
0027	90	14.23	0.07	3.45	0.77	999.99	3.44	13.66	35.585	

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 8 CAST: 8 DATE(Z): 07/20/88 TIME(Z): 00:00 POSITION: 36 4.3 N 74 20.6 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0028	4	< 0.40	< 0.10	< 0.40	0.05	999.99	4.86	26.53	34.597	
0029	10	< 0.40	< 0.10	< 0.40	0.05	999.99	4.90	26.49	34.609	
0030	15	< 0.40	< 0.10	< 0.40	0.05	999.99	4.92	26.51	34.699	
0031	20	< 0.40	< 0.10	< 0.40	0.05	999.99	4.91	26.78	35.738	
0032	45	< 0.40	< 0.10	< 0.40	0.05	999.99	4.96	25.00	35.974	
0033	56	< 0.40	< 0.10	< 0.40	0.05	999.99	4.97	21.53	36.052	
0034	64	7.71	0.28	1.16	0.50	999.99	4.21	18.45	36.083	
0035	75	14.66	0.12	2.39	0.90	999.99	3.67	15.31	35.815	
0036	91	15.63	< 0.10	2.36	0.93	999.99	4.55	12.87	35.451	

STATION: 9 CAST: 9 DATE(Z): 07/21/88 TIME(Z): 00:00 POSITION: 36 12.2 N 74 11.4 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0037	0	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.72	26.91	34.897	
0038	5	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.72	26.90	34.895	
0039	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.79	26.85	34.877	
0040	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.85	26.69	34.935	
0041	45	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.88	24.90	36.051	
0042	55	0.67	0.13	< 0.40	0.14	999.99	4.86	20.65	36.149	
0043	65	8.59	0.44	1.33	0.54	999.99	4.18	18.16	35.863	
0044	75	10.79	0.17	2.53	0.90	999.99	3.75	15.34	35.742	
0045	90	13.35	0.08	3.06	1.05	999.99	3.74	13.62	35.654	

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 10 CAST: 10 DATE(Z): 07/21/88 TIME(Z): 00:00 POSITION: 36 16.7 N 74 7.9 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0046	2	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.97	27.01	34.594	
0047	5	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.85	26.97	34.628	
0048	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.86	26.96	34.812	
0049	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.82	26.88	35.029	
0050	45	< 0.40	0.03	< 0.40	< 0.05	999.99	4.92	24.49	36.095	
0051	55	2.12	0.39	0.44	0.21	999.99	4.77	20.39	36.002	
0052	64	8.77	0.35	1.47	0.61	999.99	4.91	17.72	35.922	
0053	76	12.70	0.12	2.12	0.92	999.99	3.77	16.43	35.977	
0054	90	17.55	0.06	3.14	1.23	999.99	3.37	14.40	35.802	

STATION: 11 CAST: 11 DATE(Z): 07/24/88 TIME(Z): 00:00 POSITION: 31 59.8 N 63 57.5 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0055	2	0.40	< 0.10	< 0.40	< 0.05	999.99	4.77	27.23	36.287	
0056	9	0.40	< 0.10	< 0.40	< 0.05	999.99	4.78	27.02	36.256	
0057	20	0.40	< 0.10	< 0.40	< 0.05	999.99	4.85	26.09	36.365	
0058	30	0.40	< 0.10	< 0.40	< 0.05	999.99	4.97	22.95	36.484	
0059	40	0.40	< 0.10	< 0.40	< 0.05	999.99	5.36	21.68	36.680	
0060	60	0.40	< 0.10	< 0.40	< 0.05	999.99	5.33	20.62	36.657	
0061	81	0.40	< 0.10	< 0.40	< 0.05	999.99	5.28	19.90	36.628	
0062	99	0.40	0.07	< 0.40	< 0.05	999.99	5.07	19.49	36.617	
0063	119	2.05	0.10	< 0.40	< 0.05	999.99	4.81	19.25	36.596	

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 12 CAST: 12 DATE(Z): 07/25/88 TIME(Z): 00:00 POSITION: 32 1.4 N 63 49.5 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0064	5	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.77	27.02	36.279	
0065	21	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.90	26.06	36.363	
0066	30	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.97	25.22	36.339	
0067	50	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.40	21.43	36.675	
0068	75	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.28	20.34	36.659	
0069	91	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.19	19.92	36.630	
0070	125	1.96	0.10	< 0.40	< 0.05	999.99	4.88	19.19	36.595	
0071	241	3.23	< 0.10	< 0.40	< 0.05	999.99	5.03	18.53	36.563	
0072	738	21.36	< 0.10	4.39	1.00	999.99	3.74	12.22	35.591	

STATION: 13 CAST: 13 DATE(Z): 07/26/88 TIME(Z): 00:00 POSITION: 31 59.2 N 63 42.4 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0073	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.92	25.81	36.362	
0074	24	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.43	25.48	36.395	
0075	49	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.30	21.72	36.663	
0076	76	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.12	20.30	36.657	
0077	99	1.81	0.11	< 0.40	< 0.05	999.99	5.04	19.65	36.612	
0078	124	3.97	< 0.10	< 0.40	< 0.50	999.99	4.96	19.20	36.592	
0079	200	6.45	< 0.10	< 0.40	< 0.05	999.99	4.87	18.63	36.566	
0080	350	25.17	< 0.10	4.79	0.78	999.99	3.74	18.07	36.503	
0081	750	28.91	< 0.10	4.85	0.93	999.99	3.71	12.02	35.561	

NUTRIENT DATA

CRUISE: GC-88 LEG I

STATION: 14 CAST: 14 DATE(Z): 07/27/88 TIME(Z): 00:00 POSITION: 31 55.6 N 63 38.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0082	10	0.40	< 0.10	< 0.40	< 0.05	999.99	4.74	27.10	36.309	
0083	25	0.40	< 0.10	< 0.40	< 0.05	999.99	4.91	25.63	36.368	
0084	50	0.40	< 0.10	< 0.40	< 0.05	999.99	5.59	21.11	36.620	
0085	74	0.40	< 0.10	< 0.40	< 0.05	999.99	5.45	20.15	36.646	
0086	100	0.40	< 0.10	< 0.40	< 0.05	999.99	5.38	19.59	36.649	
0087	125	2.73	< 0.10	< 0.40	< 0.05	999.99	5.01	19.18	36.585	
0088	151	3.66	< 0.10	< 0.40	< 0.05	999.99	4.97	18.94	36.574	
0089	251	5.15	< 0.10	< 0.40	< 0.05	999.99	5.02	18.48	36.556	
0090	750	28.23	< 0.05	7.92	1.03	999.99	3.75	12.04	35.559	

STATION: 15 CAST: 15 DATE(Z): 07/28/88 TIME(Z): 00:00 POSITION: 31 48.1 N 63 39.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0091	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.95	27.33	36.283	
0092	25	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.92	25.68	36.381	
0093	31	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.41	25.26	36.447	
0094	50	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.26	21.58	36.675	
0095	75	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.08	20.40	36.659	
0096	99	1.92	0.09	< 0.40	< 0.05	999.99	4.95	19.60	36.618	
0097	126	2.88	0.07	< 0.40	< 0.05	999.99	4.87	19.22	36.593	
0098	150	3.32	0.05	< 0.40	< 0.05	999.99	5.00	18.94	36.574	
0099	251	3.01	0.05	< 0.40	< 0.05	999.99	5.06	18.46	36.554	

NUTRIENT DATA

CRUISE: GC-88 LEG II

STATION: 16 CAST: 16 DATE(Z): 08/02/88 TIME(Z): 00:00 POSITION: 39 31.6 N 54 59.8 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0100	10	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.96	24.99	34.638	
0101	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.88	21.40	34.598	
0102	30	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.80	19.16	35.055	
0103	40	5.71	0.39	0.69	0.13	999.99	4.76	17.31	35.366	
0104	60	7.78	0.12	1.41	0.17	999.99	4.58	16.26	35.688	
0105	80	9.69	0.07	1.58	0.54	999.99	4.66	15.86	35.865	
0106	99	10.85	0.05	1.95	0.54	999.99	4.57	15.66	35.902	
0107	149	14.48	0.03	3.32	0.74	999.99	4.37	15.13	35.898	
0108	200	14.70	0.06	3.41	0.68	999.99	4.31	13.67	35.683	

STATION: 17 CAST: 17 DATE(Z): 08/04/88 TIME(Z): 00:00 POSITION: 46 4.8 N 45 46.7 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0109	11	< 0.40	< 0.10	< 0.40	0.19	999.99	6.60	13.19	33.173	
0110	20	< 0.40	< 0.10	< 0.40	0.12	999.99	7.33	10.49	33.446	
0111	30	< 0.40	< 0.10	< 0.40	< 0.05	999.99	7.86	6.94	33.832	
0112	40	5.74	0.43	1.73	0.40	999.99	7.26	5.55	33.940	
0113	60	15.49	0.21	5.86	0.89	999.99	6.69	3.90	34.346	
0114	80	18.48	0.13	7.80	1.00	999.99	6.49	3.60	34.431	
0115	100	20.02	0.14	8.78	0.96	999.99	6.49	3.76	34.532	
0116	150	20.98	0.12	9.17	1.13	999.99	6.38	3.61	34.647	
0117	200	23.34	0.11	10.09	0.96	999.99	5.96	4.57	34.862	

NUTRIENT DATA

CRUISE: GC-88 LEG II

STATION: 18 CAST: 18 DATE(Z): 08/07/88 TIME(Z): 00:00 POSITION: 58 45.0 N 36 13.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0118	10	7.59	0.35	< 0.40	0.60	999.99	999.99	8.59	34.826	NO OXYGEN
0119	20	7.38	0.27	< 0.40	0.56	999.99	999.99	8.58	34.826	BROKEN
0120	30	7.18	0.29	< 0.40	0.58	999.99	999.99	8.56	34.825	PIPET
0121	40	7.80	0.38	< 0.40	0.64	999.99	999.99	8.13	34.769	
0122	61	9.72	0.44	5.43	0.89	999.99	999.99	6.79	34.877	
0123	80	11.81	0.60	7.61	0.98	999.99	999.99	6.44	34.871	
0124	100	15.57	0.16	11.56	1.01	999.99	999.99	5.84	34.897	
0125	150	16.00	0.19	12.31	1.03	999.99	999.99	5.91	34.941	
0126	200	15.26	0.17	12.35	0.99	999.99	999.99	5.80	34.932	

STATION: 19 CAST: 19 DATE(Z): 08/09/88 TIME(Z): 00:00 POSITION: 65 44.5 N 29 25.2 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0127	10	8.96	0.18	1.46	0.66	999.99	6.95	8.25	34.975	
0128	20	9.30	0.21	1.46	0.74	999.99	6.99	8.24	34.971	
0129	30	11.08	0.17	2.50	0.71	999.99	6.85	7.76	34.980	
0130	40	14.12	0.11	4.23	0.92	999.99	6.88	6.99	34.991	
0131	60	15.16	0.11	5.00	1.03	999.99	6.73	6.67	34.996	
0132	80	16.02	0.05	5.37	1.05	999.99	6.62	6.47	35.008	
0133	100	16.27	0.08	5.74	0.98	999.99	6.62	6.53	35.039	
0134	150	16.58	0.05	5.77	1.04	999.99	6.59	6.41	35.047	
0135	201	16.64	0.05	6.05	1.06	999.99	6.07	6.25	35.042	

NUTRIENT DATA

CRUISE: GC-88 LEG II

STATION: 20 CAST: 20 DATE(Z): 08/10/88 TIME(Z): 00:00 POSITION: 66 38.1 N 28 36.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0136	9	< 0.40	< 0.10	< 0.40	0.27	999.99	8.40	2.32	32.520	
0137	20	< 0.40	< 0.10	< 0.40	0.23	999.99	8.38	2.33	32.518	
0138	30	1.59	< 0.10	< 0.40	0.40	999.99	8.56	1.52	33.239	
0139	50	8.07	0.14	2.29	0.67	999.99	7.25	2.46	34.118	
0140	60	8.50	0.14	2.60	0.69	999.99	7.59	2.98	34.241	
0141	81	13.23	0.17	4.51	0.89	999.99	7.04	5.07	34.784	
0142	100	15.41	0.11	5.15	1.01	999.99	6.68	5.64	34.905	
0143	150	15.53	0.08	5.61	0.95	999.99	6.89	4.83	34.863	
0144	200	15.99	0.11	5.80	1.05	999.99	6.66	3.95	34.810	

NUTRIENT DATA

CRUISE: GC-88 LEG III

STATION: 21 CAST: 21 DATE(Z): 08/16/88 TIME(Z): 00:00 POSITION: 60 0.0 N 20 0.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0145	25	2.05	< 0.10	< 0.40	999.99	999.99	6.61	11.50	35.067	AAII PO4
0146	40	2.40	< 0.10	< 0.40	999.99	999.99	6.51	11.50	35.095	UNOPERATIONAL
0147	50	7.98	0.33	< 0.40	999.99	999.99	6.36	11.45	35.105	
0148	75	16.20	< 0.10	3.50	999.99	999.99	6.16	9.35	35.232	NO MANUAL
0149	200	17.50	< 0.10	5.40	999.99	999.99	6.33	8.63	35.072	PO4 ANAYLZED
0150	500	20.81	< 0.10	8.14	999.99	999.99	5.88	7.61	35.127	
0151	800	24.04	< 0.10	11.05	999.99	999.99	5.45	6.13	35.082	
0152	1000	23.61	< 0.10	11.01	999.99	999.99	5.65	4.90	34.997	
0153	0	999.99	999.99	999.99	999.99	999.99	999.99	99.99	99.999	NO SAMPLE 153 TAKEN

STATION: 22 CAST: 22 DATE(Z): 08/19/88 TIME(Z): 00:00 POSITION: 47 58.8 N 20 0.2 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0154	2	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.57	15.95	35.508	ONLY PO4 -
0155	20	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.57	15.94	35.509	ANALYZED MANUALLY
0156	50	1.46	0.30	< 0.40	< 0.05	999.99	5.46	14.58	35.481	
0157	75	9.85	0.03	1.25	0.77	999.99	5.48	12.48	35.640	
0158	100	11.25	< 0.10	2.10	0.56	999.99	5.45	12.10	35.606	
0159	300	14.72	< 0.10	3.70	0.71	999.99	5.49	10.94	35.483	
0160	500	15.31	< 0.10	4.16	0.78	999.99	5.59	10.40	35.432	
0161	800	24.31	< 0.10	9.80	1.23	999.99	4.51	8.54	35.254	
0162	1000	24.67	< 0.10	11.19	1.21	999.99	4.72	7.00	35.236	

NUTRIENT DATA

CRUISE: GC-88 LEG III

STATION: 23 CAST: 23 DATE(Z): 08/20/88 TIME(Z): 00:00 POSITION: 45 57.7 N 20 0.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0163	2	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.50	17.18	35.690	ONLY PO4 -
0164	35	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.45	17.08	35.682	MANUALLY ANALYZED
0165	50	< 0.40	< 0.10	< 0.40	< 0.05	999.99	5.48	16.71	35.701	
0166	60	2.40	0.27	< 0.40	0.07	999.99	5.32	15.71	35.699	
0167	70	7.82	< 0.10	< 0.40	0.25	999.99	5.33	13.64	35.692	
0168	250	12.46	< 0.10	3.24	0.56	999.99	5.46	12.14	35.651	
0169	500	16.09	< 0.10	4.30	0.72	999.99	5.27	11.04	35.479	
0170	750	22.44	< 0.10	8.38	2.46	999.99	4.89	9.39	35.307	
0171	1000	25.21	< 0.10	10.94	2.99	999.99	4.51	7.74	35.289	

STATION: 24 CAST: 24 DATE(Z): 08/20/88 TIME(Z): 00:00 POSITION: 44 0.1 N 20 1.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0172	2	< 0.40	< 0.10	< 0.40	1.45	999.99	5.39	18.35	35.699	ONLY PO4 -
0173	25	< 0.40	< 0.10	< 0.40	1.60	999.99	5.48	17.89	35.709	MANUALLY ANALYZED
0174	50	< 0.40	< 0.10	< 0.40	1.51	999.99	5.52	16.51	35.694	
0175	70	5.09	0.24	< 0.40	1.72	999.99	5.30	14.03	35.827	
0176	100	9.91	< 0.10	2.41	1.81	999.99	5.28	13.25	35.776	
0177	250	13.80	< 0.10	3.91	2.25	999.99	5.20	12.20	35.660	
0178	500	15.32	< 0.10	4.70	2.12	999.99	5.37	11.05	35.490	
0179	750	21.39	< 0.10	8.41	2.58	999.99	4.76	9.24	35.265	
0180	1000	24.00	< 0.10	11.26	2.76	999.99	4.50	8.09	35.365	

NUTRIENT DATA

CRUISE: GC-88 LEG III

STATION: 25 CAST: 25 DATE(Z): 08/21/88 TIME(Z): 00:00 POSITION: 41 58.9 N 20 0.4 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0181	2	< 0.40	< 0.10	< 0.40	0.16	999.99	5.10	21.00	35.747	ONLY PO4 -
0182	20	< 0.40	< 0.10	< 0.40	0.08	999.99	5.22	20.34	35.740	ANALYZED MANUALLY
0183	30	< 0.40	< 0.10	< 0.40	0.18	999.99	5.61	19.98	35.714	
0184	60	3.04	0.15	< 0.40	0.28	999.99	5.66	14.14	35.758	
0185	100	6.20	< 0.10	1.40	0.67	999.99	5.40	13.18	35.771	
0186	250	8.22	0.40	2.71	0.66	999.99	5.40	12.22	35.661	
0187	500	12.34	0.06	5.04	0.88	999.99	5.01	10.55	35.424	
0188	800	16.05	0.15	9.96	1.22	999.99	4.40	8.47	35.368	
0189	1000	18.03	0.06	10.53	999.99	999.99	4.58	7.93	35.498	NO PO4 SAMPLE

STATION: 26 CAST: 26 DATE(Z): 08/21/88 TIME(Z): 00:00 POSITION: 40 2.0 N 20 0.1 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0190	0	< 0.40	< 0.10	< 0.40	< 0.05	999.99	4.97	23.06	36.200	ONLY PO4 -
0191	20	< 0.40	< 0.10	< 0.40	1.61	999.99	5.06	21.83	36.204	ANALYZED MANUALLY
0192	50	< 0.40	< 0.10	< 0.40	2.15	999.99	5.61	17.47	36.081	
0193	100	3.40	0.23	< 0.40	2.32	999.99	5.17	14.75	36.008	
0194	250	7.98	< 0.10	1.61	2.14	999.99	5.10	13.11	35.780	
0195	550	14.48	< 0.10	5.00	3.29	999.99	4.75	11.14	35.538	
0196	750	16.71	< 0.10	7.42	3.23	999.99	4.21	10.77	35.693	
0197	900	16.83	0.06	8.41	3.29	999.99	4.11	10.89	35.921	
0198	1000	17.31	< 0.10	9.11	3.43	999.99	4.15	10.24	35.873	

NUTRIENT DATA

CRUISE: GC-88 LEG III

STATION: 27 CAST: 27 DATE(Z): 08/22/88 TIME(Z): 00:00 POSITION: 38 1.2 N 19 59.6 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0199	0	< 0.40	< 0.10	< 0.40	2.45	999.99	4.55	23.91	36.231	ONLY PO4 -
0200	20	< 0.40	< 0.10	< 0.40	2.66	999.99	4.59	23.43	36.165	ANALYZED MANUALLY
0201	50	< 0.40	< 0.10	< 0.40	2.43	999.99	5.54	18.64	36.035	
0202	75	< 0.40	< 0.10	< 0.40	2.43	999.99	5.81	15.62	35.927	
0203	100	4.61	< 0.10	< 0.40	2.96	999.99	999.99	14.64	35.981	
0204	300	11.84	0.19	3.62	2.84	999.99	4.99	12.17	35.634	
0205	500	15.76	< 0.10	5.69	3.33	999.99	4.85	10.96	35.489	
0206	750	19.32	< 0.10	9.27	3.07	999.99	4.21	10.29	35.655	
0207	1000	19.87	< 0.10	11.26	3.09	999.99	4.21	9.70	35.833	

STATION: 28 CAST: 28 DATE(Z): 08/22/88 TIME(Z): 00:00 POSITION: 36 1.7 N 19 59.3 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0208	0	< 0.40	< 0.10	< 0.40	2.18	999.99	4.93	23.76	36.433	ONLY PO4 -
0209	20	< 0.40	< 0.10	< 0.40	2.15	999.99	5.09	23.27	36.139	ANALYZED MANUALLY
0210	50	< 0.40	< 0.10	< 0.40	2.45	999.99	5.62	19.17	36.167	
0211	75	< 0.40	< 0.10	< 0.40	2.07	999.99	5.74	16.11	36.052	
0212	100	2.94	0.25	< 0.40	2.45	999.99	5.21	14.97	36.056	
0213	300	11.22	0.10	3.89	2.73	999.99	4.90	12.58	35.704	
0214	500	14.97	< 0.10	5.56	3.45	999.99	4.78	11.32	35.565	
0215	750	18.43	< 0.10	9.60	3.10	999.99	4.15	10.50	35.695	
0216	1000	18.52	< 0.10	10.79	3.32	999.99	4.18	10.25	35.949	

NUTRIENT DATA

CRUISE: GC-88 LEG IV

STATION: 29 CAST: 29 DATE(Z): 08/27/88 TIME(Z): 00:00 POSITION: 35 5.0 N 28 40.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0217	0	< 0.40	< 0.10	< 0.40	999.99	999.99	4.69	25.58	36.477	
0218	10	< 0.40	< 0.10	< 0.40	999.99	999.99	4.78	25.54	36.460	
0219	20	< 0.40	< 0.10	< 0.40	999.99	999.99	4.77	25.29	36.412	
0220	40	< 0.40	< 0.10	< 0.40	999.99	999.99	5.66	19.94	36.152	
0221	60	< 0.40	< 0.10	< 0.40	999.99	999.99	5.74	17.17	36.006	
0222	80	< 0.40	0.02	< 0.40	999.99	999.99	5.46	15.96	36.075	
0223	100	2.26	< 0.10	< 0.40	999.99	999.99	5.12	15.64	36.052	
0224	150	6.58	< 0.10	2.71	999.99	999.99	4.99	14.76	35.970	
0225	200	999.99	999.99	999.99	999.99	999.99	999.99	99.99	99.999	DID NOT FIRE

STATION: 30 CAST: 30 DATE(Z): 08/28/88 TIME(Z): 00:00 POSITION: 30 28.1 N 30 42.5 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0226	5	< 0.40	< 0.10	< 0.40	999.99	999.99	4.68	25.09	37.020	
0227	10	< 0.40	< 0.10	< 0.40	999.99	999.99	4.71	25.09	37.023	
0228	20	< 0.40	< 0.10	< 0.40	999.99	999.99	4.71	25.08	37.022	
0229	40	< 0.40	< 0.10	< 0.40	999.99	999.99	5.17	22.79	36.720	
0230	50	< 0.40	< 0.10	< 0.40	999.99	999.99	5.13	22.00	36.691	
0231	80	< 0.40	< 0.10	< 0.40	999.99	999.99	5.35	19.37	36.612	
0232	100	< 0.40	< 0.10	< 0.40	999.99	999.99	999.99	18.78	36.627	
0233	150	2.35	< 0.10	< 0.40	999.99	999.99	4.79	18.07	36.574	
0234	200	5.45	< 0.10	< 0.40	999.99	999.99	4.76	17.15	36.385	

NUTRIENT DATA

CRUISE: GC-88 LEG IV

STATION: 31 CAST: 31 DATE(Z): 08/29/88 TIME(Z): 00:00 POSITION: 26 0.7 N 32 41.5 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0235	0	< 0.40	< 0.10	< 0.40	999.99	999.99	4.79	24.93	37.494	AAII PO4
0236	10	< 0.40	< 0.10	< 0.40	999.99	999.99	999.99	24.91	37.498	UNOPERATIONAL
0237	20	< 0.40	< 0.10	< 0.40	999.99	999.99	4.69	24.91	37.498	
0238	40	< 0.40	< 0.10	< 0.40	999.99	999.99	4.68	24.92	37.499	NO MANUAL
0239	60	< 0.40	< 0.10	< 0.40	999.99	999.99	5.25	22.96	37.204	PO4 ANALYZED
0240	80	< 0.40	< 0.10	< 0.40	999.99	999.99	5.33	21.26	37.086	
0241	100	< 0.40	< 0.10	< 0.40	999.99	999.99	5.00	20.56	37.012	
0242	150	0.42	< 0.10	< 0.40	999.99	999.99	4.77	19.52	36.875	
0243	200	3.97	< 0.10	< 0.40	999.99	999.99	4.49	17.97	36.560	

STATION: 32 CAST: 32 DATE(Z): 08/30/88 TIME(Z): 00:00 POSITION: 21 12.4 N 34 36.5 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0244	0	< 0.40	< 0.10	< 0.40	0.60	999.99	4.72	25.68	36.830	ONLY PO4 -
0245	10	< 0.40	< 0.10	< 0.40	0.41	999.99	4.64	25.53	36.923	ANALYZED MANUALLY
0246	20	< 0.40	< 0.10	< 0.40	0.34	999.99	4.66	25.52	36.924	
0247	40	< 0.40	< 0.10	< 0.40	0.37	999.99	4.65	25.49	36.937	
0248	60	< 0.40	< 0.10	< 0.40	0.47	999.99	4.75	25.13	37.053	
0249	80	< 0.40	< 0.10	< 0.40	0.64	999.99	4.88	24.15	37.292	
0250	100	< 0.40	< 0.10	< 0.40	0.74	999.99	4.77	22.81	37.260	
0251	150	1.59	< 0.10	< 0.40	0.40	999.99	4.33	21.08	37.104	
0252	200	6.78	< 0.10	1.25	1.03	999.99	3.74	18.72	36.680	

NUTRIENT DATA

CRUISE: GC-88 LEG IV

STATION: 33 CAST: 33 DATE(Z): 08/31/88 TIME(Z): 00:00 POSITION: 16 17.5 N 36 30.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0253	0	< 0.40	< 0.10	< 0.40	0.57	999.99	4.59	26.47	36.693	ONLY PO4 -
0254	10	< 0.40	< 0.10	< 0.40	0.41	999.99	4.59	26.42	36.668	ANALYZED MANUALLY
0255	20	< 0.40	< 0.10	< 0.40	0.93	999.99	4.57	26.40	36.667	
0256	40	< 0.40	< 0.10	< 0.40	0.23	999.99	4.79	25.46	36.746	
0257	60	< 0.40	< 0.10	< 0.40	1.40	999.99	4.97	23.60	37.026	
0258	80	< 0.40	< 0.10	< 0.40	0.82	999.99	4.79	22.92	37.184	
0259	100	< 0.40	< 0.10	< 0.40	1.19	999.99	4.57	21.53	37.108	
0260	150	6.72	0.17	< 0.40	0.63	999.99	3.91	18.83	36.712	
0261	200	14.74	0.17	0.69	1.11	999.99	3.09	16.74	36.335	

STATION: 34 CAST: 34 DATE(Z): 09/01/88 TIME(Z): 00:00 POSITION: 11 58.4 N 38 10.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0262	1	0.40	< 0.10	< 0.40	0.25	999.99	4.49	27.85	36.615	FOR SAMPLES 267 TO
0263	10	0.40	< 0.10	< 0.40	0.54	999.99	4.52	27.70	36.612	270 - NO MANUAL
0264	15	0.40	< 0.10	< 0.40	0.58	999.99	4.50	27.65	36.608	PO4 ANALYZED
0265	30	0.40	< 0.10	< 0.40	0.64	999.99	4.88	26.34	36.635	
0266	50	0.40	< 0.10	< 0.40	0.57	999.99	4.97	23.84	36.718	
0267	70	0.40	< 0.10	< 0.40	999.99	999.99	4.21	21.03	36.671	
0268	100	12.70	0.23	5.23	999.99	999.99	2.92	18.05	36.422	
0269	151	26.95	0.22	12.73	999.99	999.99	2.17	12.53	35.315	
0270	200	26.95	0.20	12.34	999.99	999.99	2.30	12.21	35.357	

CRUISE: GC-88 LEG IV

STATION: 35 CAST: 35 DATE(Z): 09/02/88 TIME(Z): 00:00 POSITION: 7 1.5 N 39 56.7 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0271	1	< 0.40	< 0.10	12.64	999.99	999.99	4.48	29.00	31.200	NO MANUAL
0272	10	< 0.40	< 0.10	12.42	999.99	999.99	4.54	28.80	30.799	PO4 ANALYZED
0273	15	< 0.40	< 0.10	12.42	999.99	999.99	4.50	28.69	31.173	
0274	30	< 0.40	< 0.10	5.36	999.99	999.99	4.48	28.92	34.682	
0275	50	< 0.40	< 0.10	< 0.40	999.99	999.99	4.41	28.02	36.384	
0276	70	< 0.40	0.36	< 0.40	999.99	999.99	4.30	26.99	36.526	
0277	100	10.38	0.11	5.27	999.99	999.99	3.17	21.23	36.265	
0278	130	18.63	0.14	8.76	999.99	999.99	2.97	15.52	35.706	
0279	200	26.64	0.10	14.37	999.99	999.99	3.19	10.38	34.981	

STATION: 36 CAST: 36 DATE(Z): 09/03/88 TIME(Z): 00:00 POSITION: 8 17.9 N 44 14.9 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0280	1	0.40	< 0.10	0.68	0.49	999.99	4.46	29.03	30.806	ONLY PO4 -
0281	10	0.40	< 0.10	6.91	0.36	999.99	4.48	28.93	30.796	MANUALLY ANALYZED
0282	30	0.40	< 0.10	3.12	0.25	999.99	4.50	28.41	35.922	
0283	50	0.40	< 0.10	< 0.40	0.16	999.99	4.55	27.27	36.494	
0284	70	0.40	< 0.10	< 0.40	0.17	999.99	4.48	24.72	36.404	
0285	90	6.31	0.11	0.84	0.79	999.99	3.43	20.53	36.102	
0286	110	15.03	0.22	3.19	1.10	999.99	2.73	17.17	35.964	
0287	149	23.33	0.10	5.97	1.66	999.99	2.52	13.05	35.327	
0288	201	25.80	0.20	7.84	1.83	999.99	2.63	10.87	35.103	

NUTRIENT DATA

CRUISE: GC-88 LEG IV

STATION: 37 CAST: 37 DATE(Z): 09/04/88 TIME(Z): 00:00 POSITION: 9 38.0 N 48 47.0 W

SAMPLE #	DEPTH (M)	NO3	NO2	SIO3	PO4	NH4	O2 (ML/L)	TEMP (C)	SALINITY (0/00)	COMMENTS
		(MICROGRAM-ATOMS/LITER)								
0289	1	< 0.40	< 0.10	2.06	0.22	999.99	4.38	30.33	35.272	ONLY PO4 -
0290	10	< 0.40	< 0.10	0.97	0.33	999.99	4.46	29.23	35.980	ANALYZED MANUALLY
0291	20	< 0.40	< 0.10	< 0.40	0.14	999.99	4.45	29.13	36.033	
0292	40	< 0.40	< 0.10	0.47	0.31	999.99	4.51	27.98	36.585	
0293	60	< 0.40	< 0.10	< 0.40	0.42	999.99	4.64	26.73	36.653	
0294	80	< 0.40	< 0.10	0.53	0.35	999.99	4.37	24.82	36.751	
0295	100	< 0.40	< 0.10	1.41	0.38	999.99	3.88	23.15	36.846	
0296	149	< 0.40	< 0.10	4.50	1.37	999.99	2.55	15.45	35.902	
0297	200	14.93	0.54	6.72	1.68	999.99	2.28	11.65	35.274	

4. CHLOROPHYLL-A AND PRIMARY PRODUCTIVITY DETERMINATIONS

A. Methods

Hydrographic properties of the water column were recorded at each station with a Neil Brown Mark III CTD, fitted with a rosette multi-sampler. Water samples for salinity, oxygen, chlorophyll, and nutrient analyses were collected in 2.5 liter Niskin bottles at nine depths on the CTD upcast. Sample depths were chosen to cover the depth range of individual hydrocasts. All casts included at least four sample depths down to, and including, 100 m. Three additional samples were obtained in the upper 100 m from stations with Go-Flo bottles (see below).

The mean chlorophyll concentrations in each station report were determined from duplicate 100 ml aliquots obtained from each depth, then filtered through Whatman GF/F filters. Filters were frozen over a desiccant at -20°C in the dark. The fluorescence of 90% aqueous acetone extracts were measured in the laboratory using a Turner Designs fluorometer, after grinding the filters and extracting in the dark for 30 min. The fluorometer was calibrated with sigma chlorophyll-a, following the method of Smith et al. (1981).

Water samples for productivity determinations were collected at three depths with 10 liter Go-Flo bottles mounted on a Kevlar hydrowire. Sampling depths were selected on the basis of light extinction, or on the hydrographic structure of the water column at that station. Due to limited wire time, and the availability of only three Go-Flo bottles, samples for six light depth productivity incubations were obtained from three depths. The shallowest bottle provided samples for the 100 and 60% I_o samples, the mid-depth bottle was used for the 32 and 17% I_o samples, and the deep bottle provided the 7 and 1% I_o samples.

Vertical extinction coefficients were measured at most stations by lowering a Lambda Instruments LI-190S 4π spherical collector on the hydrowire. Photosynthetically available radiation (PAR) was measured at various depths to derive k (m^{-1}) with a LI-185 quantum meter. A Secchi disk was used to make an estimation of k when light casts were not performed. When weather prohibited any determination of the extinction coefficient, the value from the previous day was used to estimate isolume depths.

Productivity measurements were made by the carbon-14 method, originally described by Steemann Nielsen (1952), with modifications of Fitzwater et al. (1982) to minimize trace metal contamination. All materials were acid-cleaned in dilute (0.1 N) HCl, then rinsed copiously with Milli-Q (18 megohm) water. Incubation bottles were rinsed with the seawater sample prior to filling. Between incubations, sample bottles were rinsed with dilute HCl and three rinses of Milli-Q water. Samples were collected from the Go-Flo bottles in darkened 2 liter acid-cleaned polycarbonate bottles. Approximately 250 ml of sample was transferred to each of three (two light, one dark) acid-cleaned polycarbonate bottles and inoculated with 5 uCi of $NaH^{14}CO_3$ with acid-cleaned Eppendorf pipettes. The isotope (Amersham Searle CFA.3) was prepared in a carrier solution of 0.3 g l^{-1} BIA grade Na_2CO_3.

The three incubation bottles were encased in elongate tubes of neutral density (PVC) screening simulating 100, 60, 32, 17, 7, or 1% of the surface I_o. Samples were incubated on deck for four to six hours in clear plexiglass cylinders filled with circulating near-surface seawater. Samples were transported to the laboratory in darkness, filtered through Whatman GF/F filters

under a vacuum of < 50 mm Hg, and rinsed with filtered seawater before the surface was dry. The filters were transferred to Nalgene scintillation bags, acidified with 0.5 N HCl, and after 60 min. 3 ml of Aquasol II scintillation cocktail was added (Hitchcock, 1986). Activity was measured aboard ship with a Tracor Model 300 scintillation counter. Productivity (mgC m^{-3} h^{-1}) was calculated from the mean value of the two light bottles minus the dark bottle activity.

No data were obtained from test CTD casts 1 and 2; therefore, station summaries are not included for these casts. Other excluded station summaries include cast 4, which was aborted due to mechanical malfunction, and cast 25, which was aborted due to heavy seas.

B. Station Data

See the following pages for station data.

CAST: 3 DATE: 71788 POSITION: 33° 55.10' N 74° 40.40' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	26.44	34.55	0.11	0.29	100		0.00
5	26.43	34.55	0.30	0.57	60		0.00
10	26.32	34.65	0.70	1.54	32		0.00
20	25.61	36.02	0.53	0.82	17		0.00
30	24.59	36.14	0.30	0.40	7		0.00
40	19.34	36.08	0.19	0.27	1		0.00
50	16.34	35.89	0.21	0.28			0.00
60	14.23	35.68	0.23	0.27			0.00
70	12.91	35.5	0.24	0.32			0.00

NOTE: Productivity not available

CAST: 5 DATE: 71988 POSITION: 35° 55.10' N 74° 40.10' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
1	30.11	34.47	0.19	0.28	100	5	2.87
7	26.15	34.47	0.16	0.21	60	5	3.39
10	26.09	34.54	0.15	0.21	32	10	3.07
20	25.53	36.22	0.17	0.24	17	10	2.33
31	24.58	36.19	0.25	0.44	7	10	1.63
40	22.1	35.99	1.27	2.74	1	10	0.54
50	17.06	36	0.33	0.67			0.00
60	12.46	35.18	0.10	0.23			0.00
75	12.03	35.2	0.01	0.09			0.00

CAST: 6 DATE: 71968 POSITION: 35° 54.60' N 74° 35.30' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
1	26.61	34.45	0.13	0.24	100		0.00
10	26.47	34.55	0.14	0.23	60		0.00
14	26.21	34.96	0.16	0.24	32		0.00
20	25.93	35.58	0.16	0.25	17		0.00
44	21.93	36.08	1.14	2.19	7		0.00
54	18.78	35.99	0.89	2.11	1		0.00
65	16.46	36.02	0.62	1.19			0.00
76	14.39	35.6	0.04	0.13			0.00
90	12.39	35.4	0.02	0.08			0.00

NOTE: Productivity not available

CAST: 7 DATE: 72088 POSITION: 35° 59.40' N 74° 26.80' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
4	26.29	34.58	0.14	0.23	100	15	1.58
10	26.28	34.58	0.13	0.18	60	15	2.51
14	26.28	34.58	0.15	0.21	32	15	2.28
20	26.46	34.9	0.19	0.27	17	15	2.29
46	24.99	36.12	0.49	0.82	7	15	1.38
55	23.02	36.09	0.29	0.43	1	15	0.56
65	19.23	36.01	1.37	2.78			0.00
75	17.68	36.06	0.49	1.11			0.00
90	13.66	35.59	0.05	0.11			0.00

CAST: 8 DATE: 72088 POSITION: 36° 04.30' N 74° 20.60' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	26.53	34.6	0.05	0.09	100		0.00
10	26.49	34.61	0.07	0.11	60		0.00
15	26.51	34.7	0.07	0.11	32		0.00
20	26.78	35.74	0.11	0.18	17		0.00
45	25	35.97	0.85	1.33	7		0.00
55	21.53	36.05	0.92	1.85	1		0.00
65	18.45	36.08	0.96	2.34			0.00
75	15.31	35.82	0.38	0.76			0.00
90	12.87	35.45	0.01	0.07			0.00

NOTE: Productivity not available

CAST: 9 DATE: 72188 POSITION: 36° 12.20' N 74° 11.40' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
0	26.91	34.9	0.14	0.19	100	18	2.32
5	26.9	34.9	0.15	0.21	60	18	2.09
8	26.88	34.89	0.13	0.19	32	18	1.83
10	26.85	34.88	0.15	0.19	17	18	0.88
18	26.68	34.9	0.17	0.23	7	18	0.39
20	26.69	34.94	0.18	0.25	1	18	0.28
28	26.23	35.76	0.39	0.53			0.00
45	24.9	36.05	0.67	1.09			0.00
55	20.65	36.15	1.21	2.38			0.00
65	18.16	35.86	0.61	0.86			0.00
75	15.34	35.74	0.29	0.56			0.00
90	13.62	35.65	0.09	0.18			0.00

CRUISE: [illegible] DATE: 72 88 POSITION: 36° 16.70' N 74° 07.90' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE VOLUME (% Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
2	34.59	27.01	0.10	0.16	100	18	2.15
5	34.83	26.97	0.10	0.16	50	18	1.94
8	34.83	26.97	0.09	0.15	32	18	1.79
10	34.81	26.98	0.12	0.18	17	18	0.82
20	35.03	26.88	0.19	0.30	7	18	0.35
45	36.1	24.49	0.75	1.47	1	18	0.25
55	36	20.39	0.85	2.34			0.00
64	35.92	17.72	0.48	1.05			0.00
76	35.98	16.43	0.35	0.68			0.00
90	35.8	14.4	0.05	0.13			0.00

NOTE: Productivity not available

CAST: 11 DATE: 72488 POSITION: 31°59.80' N 63°57.50' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	27.23	36.29	0.01	0.03	100	5	0.33
5	27.12	36.26	0.02	0.03	60	5	0.45
10	27.02	36.26	0.01	0.02	32	10	0.34
15	26.95	36.34	0.02	0.03	17	10	0.27
20	26.09	36.37	0.02	0.03	7	15	0.15
30	22.95	36.48	0.01	0.02	1	15	0.07
40	21.68	36.68	0.04	0.06			0.00
60	20.62	36.66	0.05	0.08			0.00
81	19.9	36.63	0.12	0.20			0.00
100	19.49	36.62	0.14	0.34			0.00

CAST: 12 DATE: 72588 POSITION: 32° 01.40' N 63° 49.50' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
5	27.02	36.28	0.04	0.04	100	2	0.35
21	26.06	36.36	0.04	0.04	60	15	0.37
30	25.22	36.34	0.05	0.05	32	20	0.31
50	21.43	36.68	0.06	0.07	17	40	0.26
75	20.34	36.66	0.09	0.13	7	60	0.11
91	19.92	36.63	0.11	0.18	1	80	0.13

CAST: 13 DATE: 72688 POSITION: 31° 59.20' N 63° 42.40' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
15	26.68	36.35	0.04	0.04	100	15	0.26
20	25.81	36.36	0.05	0.05	60	15	0.44
24	25.48	36.4	0.05	0.05	32	50	0.47
49	21.72	36.66	0.09	0.12	17	50	0.36
76	20.3	36.66	0.18	0.33	7	100	0.32
99	19.65	36.61	0.28	0.56	1	100	0.39

CAST: 14 DATE: 72788 POSITION: 31° 55.60' N 63° 38.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
10	27.1	36.31	0.04	0.05	100	15	0.36
15	27.09	36.33	0.03	0.03	60	15	0.49
25	25.63	36.37	0.05	0.05	32	50	0.39
50	21.11	36.62	0.04	0.04	17	50	0.31
74	20.15	36.65	0.08	0.11	7	100	0.34
100	19.59	36.65	0.20	0.34	1	100	0.32

CAST: 15 DATE: 72888 POSITION: 31° 48.10' N 63° 39.10' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
10	27.33	36.28	0.04	0.04	100	15	0.12
15	27.15	36.35	0.03	0.03	60	15	0.08
25	25.68	36.38	0.03	0.03	32	30	0.10
31	25.26	36.45	0.05	0.05	17	30	0.13
50	21.58	36.68	0.09	0.13	7	80	0.07
75	20.4	36.66	0.15	0.33	1	80	0.07
80	20.21	36.65	0.11	0.17			0.00
99	19.6	36.62	0.23	0.59			0.00

CAST: 16 DATE: 80288 POSITION: 39° 31.60' N 54° 59.80' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
10	24.99	34.64	0.19	0.29	100	15	1.17
15	23.24	34.16	0.22	0.31	60	15	1.83
20	21.4	34.6	0.27	0.37	32	50	3.95
30	19.16	35.06	0.34	0.47	17	50	5.49
40	17.31	35.37	0.40	0.78	7	80	0.16
50	16.57	35.52	1.40	1.89	1	80	0.20
60	16.26	35.69	0.23	0.35			0.00
80	15.86	35.87	0.12	0.17			0.00
99	15.66	35.9	0.01	0.04			0.00

CAST: 17 DATE: 80488 POSITION: 46° 04.80' N 45° 46.70' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
10	13.19	33.17	0.19	0.27	100	10	0.70
15	12.62	33.32	0.35	0.48	60	10	1.37
20	10.49	33.45	0.38	0.56	32	10	1.87
30	6.94	33.83	1.03	1.44	17	10	1.95
40	5.55	33.94	0.76	1.14	7	50	0.42
50	4.39	34.14	0.23	0.37	1	50	0.47
60	3.9	34.35	0.04	0.11			0.00
80	3.6	34.43	0.02	0.06			0.00
100	3.76	34.53	0.01	0.05			0.00

CAST: 18 DATE: 80788 POSITION: 58° 45.00' N 36° 13.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
10	8.59	34.83	0.14	0.24	100	10	0.93
20	8.58	34.83	0.18	0.35	60	10	0.98
30	8.56	34.83	0.28	0.42	32	20	0.77
40	8.13	34.77	0.17	0.38	17	20	1.05
61	6.79	34.88	0.29	0.46	7	40	0.85
80	6.44	34.87	0.06	0.11	1	40	0.58
100	5.84	34.89	0.02	0.05			0.00

CAST: 19 DATE: 80988 POSITION: 65°44.50' N 29°25.20' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
10	8.25	34.98	0.56	0.86	100	10	0.51
20	8.24	34.97	0.72	1.08	60	10	0.75
30	7.76	34.98	0.35	0.54	32	20	1.10
40	6.99	34.99	0.12	0.23	17	20	1.33
60	6.67	34.99	0.08	0.16	7	30	1.04
80	6.47	35.01	0.03	0.09	1	30	0.75
100	6.53	35.04	0.03	0.07			0.00

CAST: 20 DATE: 31088 POSITION: 66° 38.10' N 28° 36.10' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
5	2.33	32.51	1.48	2.07	100	5	1.34
9	2.32	32.52	0.85	1.05	60	5	1.20
15	2.32	32.52	1.33	1.77	32	15	1.24
20	2.33	32.52	0.89	1.12	17	15	1.16
30	1.52	33.24	0.98	1.57	7	30	0.30
50	2.46	34.12	0.20	0.39	1	30	0.18
60	2.98	34.24	0.11	0.27			0.00
61	5.07	34.78	0.05	0.15			0.00
100	5.64	34.91	0.04	0.16			0.00

CAST: 21 DATE: 81688 POSITION: 60° 00.00' N 20° 00.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
5	12.24	35.09	2.51	3.37	100	5	2.07
10	12.24	35.1	2.51	3.49	60	5	2.17
20	11.89	35.09	2.84	4.14	32	10	2.09
25	11.5	35.07	0.72	1.45	17	10	2.01
40	11.5	35.1	0.49	0.98	7	20	1.65
50	11.45	35.11	0.30	0.60	1	20	1.59
75	9.35	35.23	0.04	0.11			0.00

CAST: 23 DATE: 31988 POSITION: 47° 58.80' N 20° 00.02' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
2	15.95	35.51	0.67	1.03	100		0.00
20	15.94	35.51	0.72	1.06	60		0.00
50	14.58	35.48	0.53	1.00	32		0.00
75	12.48	35.64	0.09	0.19	17		0.00
100	12.1	35.61	0.03	0.04	7		0.00
					1		0.00

NOTE: Productivity not available

CAST: 23 DATE: 82088 POSITION: 45° 57.70' N 20° 00.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
2	17.18	35.69	0.36	0.46	100	5	2.29
5	17.18	35.69	0.40	0.55	60	5	2.89
15	17.17	35.69	0.44	0.60	32	15	2.64
30	17.15	35.69	0.63	0.89	17	15	2.00
35	17.08	35.68	0.69	0.88	7	30	1.94
50	16.71	35.7	0.53	0.74	1	30	0.88
60	15.71	35.7	0.38	0.57			0.00
70	13.64	35.69	0.18	0.24			0.00

CAST: 24 DATE: 82088 POSITION: 44° 00.10' N 20° 01.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
2	18.35	35.7	0.31	0.39	100		0.00
25	17.89	35.71	0.55	0.66	60		0.00
50	16.51	35.69	0.83	1.16	32		0.00
70	14.03	35.83	0.30	0.51	17		0.00
100	13.25	35.78	0.03	0.07	7		0.00
					1		0.00

NOTE: Productivity not available

CAST: 26 DATE: 82188 POSITION: 40° 02.00' N 20° 00.10' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	23.06	36.2	0.06	0.09	100		0.00
20	21.83	36.2			60		0.00
50	17.47	36.08	0.09	0.14	32		0.00
100	14.75	35.78	0.25	0.59	17		0.00
					7		0.00
					1		0.00

NOTE: Productivity not available

CAST: 27 DATE: 82288 POSITION: 38° 01.20' N 19° 59.60' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
0	23.91	36.23	0.07	0.08	100	5	0.71
5	23.76	36.23	0.06	0.09	60	5	0.57
20	23.43	36.17	0.07	0.09	32	20	0.60
50	18.64	36.04	0.10	0.17	17	20	0.33
75	15.62	35.93	0.19	0.37	7	50	0.23
100	14.64	35.98	0.33	0.79	1	50	0.06

CAST: 28 DATE: 82288 POSITION: 36° 01.70' N 19° 59.30' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	23.76	36.43	0.07	0.08	100		0.00
20	23.27	36.14	0.07	0.08	60		0.00
50	19.17	36.17	0.11	0.17	32		0.00
75	16.11	36.05	0.21	0.33	17		0.00
100	14.97	36.06	0.23	0.53	7		0.00
					1		0.00

NOTE: Productivity not available

CAST: 29 DATE: 82788 POSITION: 35° 05.00' N 28° 40.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
0	25.58	36.48	0.03	0.05	100	5	0.51
5	25.56	36.48	0.06	0.08	60	5	0.81
10	25.54	36.46	0.06	0.08	32	15	0.32
15	25.47	36.45	0.05	0.07	17	15	0.25
20	25.29	36.41	0.06	0.07	7	50	0.42
40	19.94	36.15	0.14	0.19	1	50	0.22
50	18.61	36.16	0.14	0.24			0.00
60	17.17	36.01	0.19	0.31			0.00
80	15.96	36.08	0.36	0.72			0.00
100	15.64	36.05	0.25	0.57			0.00

CAST: 30 DATE: 82888 POSITION: 30° 28.10' N 30° 42.50' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
5	25.09	37.02	0.04	0.05	100	5	0.25
10	25.09	37.02	0.04	0.06	60	5	0.32
15	25.07	37.02	0.04	0.06	32	15	0.28
20	25.08	37.02	0.03	0.04	17	15	0.21
40	22.79	36.72	0.05	0.07	7	60	0.32
50	22	36.69	0.06	0.08	1	60	0.20
60	20.83	36.65	0.10	0.18			0.00
80	19.37	36.61	0.13	0.22			0.00
100	18.78	36.63	0.19	0.37			0.00

CAST: 31 DATE: 82988 POSITION: 26° 00.70' N 32° 41.50' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
0	24.93	37.49	0.06	0.08	100	5	0.53
5	24.91	37.5	0.07	0.08	60	5	0.52
10	24.91	37.5	0.06	0.08	32	15	0.48
15	24.91	37.5	0.17	0.25	17	15	0.18
20	24.91	37.5	0.03	0.04	7	50	0.28
40	24.92	37.5	0.07	0.09	1	50	0.15
50	24.45	37.37	0.07	0.09			0.00
60	22.96	37.2	0.10	0.16			0.00
80	21.26	37.09	0.17	0.28			0.00
100	20.56	37.01	0.22	0.40			0.00

CAST: 32 DATE: 83088 POSITION: 21° 12.40' N 34° 36.50' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
0	25.68	36.83	0.07	0.09	100	5	0.36
5	25.53	36.92	0.04	0.08	60	5	0.41
10	25.53	36.92	0.06	0.08	32	15	0.38
15	25.52	36.92	0.06	0.07	17	15	0.35
20	25.52	36.92	0.08	0.10	7	50	0.13
40	25.49	36.94	0.08	0.10	1	50	0.00
50	25.23	36.98	0.10	0.16			0.00
60	25.13	37.05	0.10	0.15			0.00
80	24.15	37.29	0.12	0.20			0.00
100	22.81	37.26	0.23	0.38			0.00

CAST: 33 DATE: 83188 POSITION: 16° 17.50' N 36° 30.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
0	26.47	36.69	0.09	0.11	100	5	0.44
5	26.44	36.66	0.08	0.10	60	5	0.54
10	26.42	36.67	0.08	0.10	32	15	0.75
15	26.41	36.67	0.11	0.15	17	15	0.52
20	26.4	36.67	0.09	0.11	7	70	0.30
40	25.46	36.75	0.10	0.17	1	70	0.25
60	23.6	37.03	0.15	0.22			0.00
70	23.24	37.08	0.10	0.14			0.00
80	22.92	37.18	0.23	0.33			0.00
100	21.53	37.11	0.23	0.46			0.00

CAST: 34 DATE: 90188 POSITION: 11° 58.40' N 38° 10.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
1	27.85	36.62	0.05	0.08	100	5	0.54
5	27.71	36.61	0.09	0.12	60	5	0.52
10	27.7	36.61	0.06	0.13	32	20	0.37
15	27.65	36.61	0.07	0.09	17	20	0.16
20	27.6	36.61	0.09	0.10	7	80	0.44
30	26.34	36.64	0.11	0.17	1	80	0.31
50	23.84	36.72	0.18	0.27			0.00
70	21.03	36.67	0.28	0.50			0.00
80	20.11	36.65	0.28	0.67			0.00
100	18.05	36.42	0.18	0.47			0.00

CAST: 35 DATE: 90288 POSITION: 7° 01.50' N 39° 56.70' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($ngC\ m^{-3}\ h^{-1}$)
1	29	31.2	0.10	0.17	100	5	0.82
5	28.84	30.76	0.08	0.12	60	5	1.09
10	28.8	30.8	0.09	0.13	32	25	0.99
15	28.69	31.17	0.14	0.22	17	25	0.87
25	29.08	33.67	0.18	0.31	7	80	0.14
30	28.92	34.68	0.20	0.33	1	80	0.17
50	28.02	36.38	0.26	0.43			0.00
70	26.99	36.53	0.26	0.50			0.00
80	25.96	36.5	0.12	0.36			0.00
100	21.23	36.27	0.06	0.21			0.00

CAST: 36 DATE: 90388 POSITION: 08° 17.90' N 44° 14.90' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a ($mg\ m^{-3}$)	TOTAL PIGMENT ($mg\ m^{-3}$)	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY ($mgC\ m^{-3}\ h^{-1}$)
1	29.03	30.81	0.16	0.24	100	5	1.35
5	28.96	30.76	0.18	0.26	60	5	2.20
10	28.93	30.8	0.16	0.26	32	20	1.81
20	28.94	33.94	0.31	0.43	17	20	1.84
30	28.41	35.92	0.31	0.44	7	60	1.52
50	27.27	36.49	0.40	0.58	1	60	1.08
60	26.62	36.46	0.60	1.02			0.00
70	24.72	36.4	0.53	0.90			0.00
90	20.53	36.1	0.09	0.33			0.00

CAST: 37 DATE: 90488 POSITION: 09° 38.00' N 48° 47.00' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
1	30.33	35.27	0.05	0.09	100	5	0.90
5	29.32	35.16	0.08	0.11	50	5	1.02
10	29.23	35.98	0.04	0.06	32	15	0.89
15	29.21	36.02	0.07	0.10	17	15	0.63
20	29.13	36.03	0.04	0.06	7	90	0.25
40	27.98	36.59	0.10	0.14	1	90	0.35
60	26.73	36.65	0.08	0.14			0.00
80	24.82	36.75	0.15	0.36			0.00
90	23.84	36.84					0.00
100	23.15	36.85	0.18	0.50			0.00

CAST: 38 DATE: 90588 POSITION: 11° 05.50' N 53° 18.60' W

DEPTH (m)	TEMPERATURE (°C)	SALINITY (psu)	CHL a (mg m^{-3})	TOTAL PIGMENT (mg m^{-3})	PRODUCTIVITY: SAMPLE ISOLUME % (Surface Light)	PRODUCTIVITY: SAMPLE DEPTH (m)	PRODUCTIVITY: PRIMARY PRODUCTIVITY (mgC m^{-3} h^{-1})
5	29.14	34.81	0.09	0.14	100	5	0.53
10	29.13	34.82	0.10	0.16	60	5	0.92
15	29.11	34.91	0.08	0.14	32	15	0.54
20	28.94	35.86	0.08	0.11	17	15	0.35
40	27.87	36.5	0.09	0.14	7	70	0.34
61	27.11	36.58	0.13	0.20	1	70	0.28
70	26.4	36.63	0.25	0.40			0.00
80	25.38	36.91	0.22	0.42			0.00
100	22.7	36.82	0.26	0.74			0.00

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