

# Cruise Report S-222

Scientific Data Collected Aboard  
*SSV Robert C. Seamans*

Honolulu, Hawaii –  
Christmas Island, Kiribati – Papeete, Tahiti  
26 March 2009 – 1 May 2009



Sea Education Association  
Woods Hole, Massachusetts

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## **Ship's Company**

SSV *Robert C. Seamans*, Cruise S-222

### **Nautical Staff**

Elliot Rappaport	Captain
Jeff Stone	Chief Mate
Amanda Madeira	Second Mate
Erin Bostrom	Third Mate
James Joslin	Engineer
Mackenzie Haberman	Assistant Engineer
Sarah Overton	Steward
Kyle Sherman	Assistant Steward
Ben Spivak	Deckhand
Cynthia Landgren	Deckhand

### **Scientific Staff**

Amy Siuda	Chief Scientist
Nick Shonka	First Assistant Scientist
Katy Hunter	Second Assistant Scientist
Stephanie Jaeger	Third Assistant Scientist
Tracy Sylvester	Labhand

### **Students**

Ryan Bash	Kenyon College
Casey Canfield	Franklin W. Olin College of Engineering
Bryce Colby	Oregon State University
Devin Farkas	Hamilton College
Liana James	Juniata College
Luay Khoury	University of Pennsylvania
Meagan Kochel	Ripon College
Peter Lauer	Lesley College
Jess Lucas	University of New England, Biddeford
Katie McCusker	MIT
Ben Sinnett	RIT
Natalie Turner	University of Connecticut, Storrs
Ashley Zuorski	Eckerd College

### **Visiting Teacher**

John Wigglesworth	Waring School, Beverly, MA
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## **Introduction**

This cruise report provides a summary of scientific activities aboard the SSV *Robert C. Seamans* during cruise S-222 (26 March – 1 May 2009). The 2500 nm cruise served as the second half of the 12-week Sea Semester: Ocean Exploration program with Sea Education Association (SEA), during which extensive oceanographic sampling was conducted for both student research projects (Table 1) and the ongoing SEA research program. Students examined physical, chemical, biological, and environmental oceanographic characteristics in accordance with their written proposals and presented their results in a final poster session and papers (available upon request from SEA).

The brief summary of data contained in this report is not intended to represent final data interpretation and should not be excerpted or cited without written permission from SEA.

Amy NS Siuda  
Chief Scientist, S-222

Table 1. Student research projects, S-222.

Title	Student Investigator(s)
Prey Selectivity and Distribution of Eastern Pacific Myctophidae.	Ryan Bash Katie McCusker
Ocean Stratification: Formation and Impact on Primary Production.	Casey Canfield Luay Khuory
Assessment of Trace Metal Limitation on Phytoplankton Growth in the Equatorial Pacific.	Bryce Colby
Effects of Sea Surface Temperature, Salinity and Depth on CO <sub>2</sub> Alkalinity: What the Flux is Happening?	Devin Farkas Meagan Kochel Ben Sinnett
Salp Size, Abundance, and Biovolume in Relation to Phytoplankton and Temperature in an Equatorial Transect of the Pacific Ocean.	Liana James
Physical Factors Affecting the Distribution of <i>Physalia physalis</i> .	Peter Lauer Natalie Turner
Depth and Intensity of Maximum Bioluminescence in Relationship to Dissolved Oxygen Levels, Lunar Phases, and Fluorescence.	Jess Lucas
Carbonate Saturation of the Equatorial Pacific Waters.	Ashley Zuorski

Table 2. Academic Program.

<b>Date</b>	<b>Topic</b>	<b>Speaker(s)</b>
27 Mar	HI Fish Auction, United Fishing Agency	Brooks Takenaka
28 Mar	Introduction to Academic Program Heaving To & HC Deployment	Siuda & Rappaport Crew
30 Mar	Water Sample Collection	Assistant Scientists
31 Mar	Engineering Systems Overview	Joslin & Haberman
1 Apr	Marine Reserves	Shonka
2 Apr	Squall Formation and Response	Rappaport
3 Apr	Lab Practical	All Hands
6 Apr	Line Chase	All Hands
7 Apr	Discussion: Sea Level Rise	Wigglesworth & Siuda
11 Apr	Deck Practical	All Hands
13 Apr	Deck Feature (DF): Poly. Navigation Precompute Stars	Lauer & Zuorski Wigglesworth
14 Apr	Argo Program Summary and Deployment	Siuda
15 Apr	DF: Anchoring & Tropical Weather	Sinnett, James, Lucas
16 Apr	Star Site Reduction	Wigglesworth
17 Apr	DF: Unusual Sailing Rigs & CNav Tech. Research Project Data Discussion	Kochel & Farkas Students
20 Apr	Nitrogen Fixation	Jaeger
21 Apr	DF: Watermakers Marlinspike Seamanship	Colby Madeira, Spivak, Bostrom
22 Apr	Fishing Techniques History of Sail Training	Sylvester Stone
26 Apr	DF: Tides & Atolls	Turner, McCusker, Khuory

Table 2 continued. Academic Program

27 Apr	Poster Presentations	Students
28 Apr	Naval Architecture DF: Ship Construction	Landgren Canfield & Bash
29 Apr	Discussion: Conservation Biology	Hunter & Siuda



## Data Description

This section provides a record of data collected aboard the SSV *Robert C. Seamans* cruise S-222 (US State Department Cruise: 2008-110, leg 1) on a north to south transect of the Equatorial Pacific, beginning in Honolulu, Hawaii and ending in Papeete, Tahiti (Figure 1). Port stops were made at Christmas Island, Kiribati and Bora Bora.

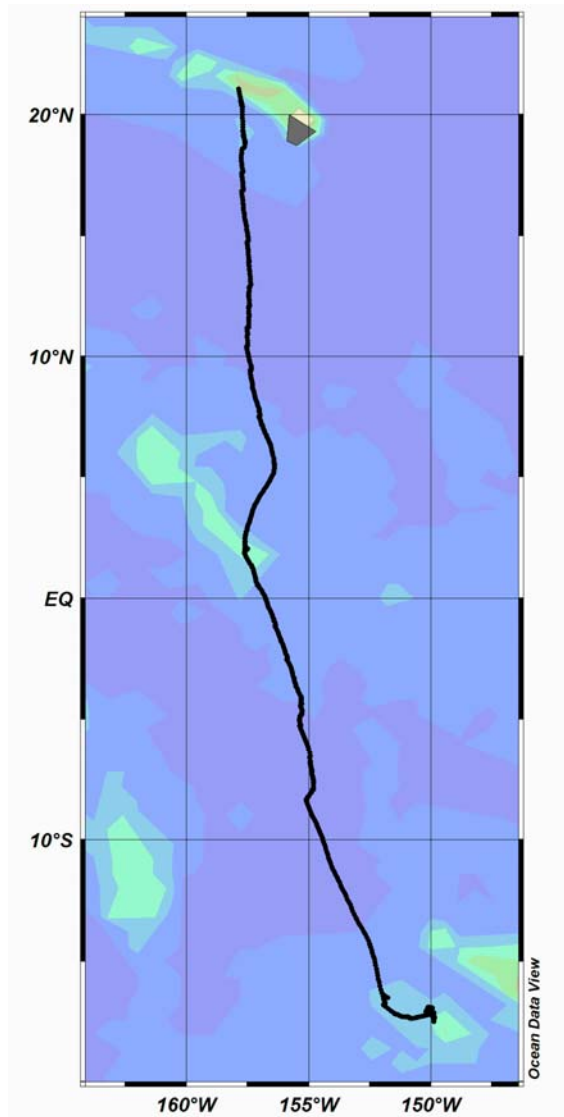


Figure 1. Hourly positions along the S-222 cruise track.

During the six-week voyage, we sampled at 38 discrete oceanographic stations (Table 3). Of the 62 surface sampling stations, 36 occurred coincident with hydrocast and neuston tow stations (Table 4). Additionally, we continuously sampled water depth and sub-bottom profiles (CHIRP system), upper ocean currents (ADCP, Figure 2), and sea surface temperature, salinity, and *in vivo*

fluorescence, CDOM, and transmittance (seawater flow-through system, Figure 3 – temperature, salinity and fluorescence).

Discrete CTD measurements of vertical temperature and salinity profiles are presented in Figure 4. Additional instrumentation on the CTD allowed for profiling of dissolved oxygen, fluorescence and CDOM (Figure 5). Summaries of sea surface and water column chemical and biological properties are found in Tables 4-7. Lengthy CTD, CHIRP, ADCP and flow-through data are not fully presented here. All unpublished data can be made available by arrangement with the SEA data archivist (contact information, p. 2).

Table 3. Oceanographic sampling stations. Sampling depth indicated.

Station	Date	Local Time	Latitude	Longitude	Depth (m)	General Locale
<b>Free CTD</b>						
001-CTD	28-Mar-09	1528	19°19.6' N	157°41.4' W	468	Subtropical N Pacific
002-CTD	28-Mar-09	2157	19°06.8' N	157°39.3' W	607	Subtropical N Pacific
003-CTD	29-Mar-09	0943	18°36.9' N	157°38.4' W	509	Subtropical N Pacific
004-CTD	29-Mar-09	2150	17°36.6' N	157°41.6' W	525	Subtropical N Pacific
005-CTD	30-Mar-09	0925	16°50.6' N	157°40.5' W	540	Subtropical N Pacific
006-CTD	31-Mar-09	0945	14°46.7' N	157°28.2' W	545	Subtropical N Pacific
007-CTD	31-Mar-09	2130	13°54.2' N	157°25.8' W	494	Subtropical N Pacific
008-CTD	1-Apr-09	0925	12°53.8' N	157°22.8' W	510	Subtropical N Pacific
009-CTD	1-Apr-09	2148	12°04.8' N	157°24.9' W	527	Subtropical N Pacific
010-CTD	2-Apr-09	0935	11°11.4' N	157°27.0' W	522	Subtropical N Pacific
011-CTD	2-Apr-09	2143	10°23.7' N	157°30.9' W	543	Subtropical N Pacific
012-CTD	3-Apr-09	0856	9°27.6' N	157°20.0' W	497	Subtropical N Pacific
013-CTD	3-Apr-09	2103	8°41.1' N	157°16.9' W	521	Subtropical N Pacific
014-CTD	4-Apr-09	0933	7°43.5' N	157°1.0' W	581	Subtropical N Pacific
015-CTD	4-Apr-09	2107	7°09.3' N	156°55.2' W	593	NECC
016-CTD	5-Apr-09	0910	6°24.5' N	156°35.9' W	568	NECC
017-CTD	5-Apr-09	2139	5°30.2' N	156°24.0' W	607	NECC
018-CTD	12-Apr-09	1136	1°49.8' N	157°36.7' W	550	4nm NW of Kiritimati
019-CTD	12-Apr-09	2114	1°17.1' N	157°18.7' W	523	NECC
020-CTD	13-Apr-09	0905	0°32.2' N	157°5.2' W	553	EUC
021-CTD	13-Apr-09	2138	0°02.9' S	156°44.4' W	476	EUC
022-CTD	14-Apr-09	1028	0°53.7' S	156°24.8' W	482	EUC
023-CTD	14-Apr-09	2335	1°44.5' S	156°7.8' W	439	EUC
024-CTD	15-Apr-09	0927	2°28.0' S	155°51.3' W	483	SEC
025-CTD	15-Apr-09	2107	3°18.7' S	155°35.1' W	492	SEC
026-CTD	16-Apr-09	0930	4°06.1' S	155°17.3' W	558	SEC
027-CTD	17-Apr-09	0907	4°49.1' S	155°17.3' W	606	SEC
028-CTD	17-Apr-09	2133	5°16.8' S	155°19.6' W	576	SEC
029-CTD	18-Apr-09	1035	6°35.0' S	154°55.8' W	587	Subtropical S Pacific
030-CTD	18-Apr-09	2115	7°11.4' S	154°51.3' W	571	Subtropical S Pacific
031-CTD	19-Apr-09	0907	7°55.8' S	154°47.3' W	520	Subtropical S Pacific

Table 3 continued.

Station	Date	Local Time	Latitude	Longitude	Depth (m)	General Locale
032-CTD	25-Apr-09	2136	16°43.2' S	151°52.1' W	605	12 nm SW of Bora Bora
033-CTD	26-Apr-09	1210	17°09.9' S	151°28.6' W	608	Subtropical S Pacific
034-CTD	26-Apr-09	2203	17°19.7' S	150°52.6' W	525	Subtropical S Pacific
035-CTD	27-Apr-09	0958	17°11.2' S	150°9.6' W	595	Subtropical S Pacific
036-CTD	27-Apr-09	2143	17°02.7' S	150°11.1' W	604	Subtropical S Pacific
037-CTD	28-Apr-09	0927	16°56.7' S	150°2.4' W	2872	Subtropical S Pacific
<b>Hydrocast/CTD</b>						
003-HC	29-Mar-09	1045	18°36.2' N	157°40.4' W	432	Subtropical N Pacific
005-HC	30-Mar-09	1026	16°51.2' N	157°42.2' W	898	Subtropical N Pacific
006-HC	31-Mar-09	1039	14°45.9' N	157°29.2' W	541	Subtropical N Pacific
008-HC	1-Apr-09	1032	12°52.5' N	157°24.3' W	506	Subtropical N Pacific
010-HC	2-Apr-09	1037	11°11.0' N	157°28.8' W	490	Subtropical N Pacific
012-HC	3-Apr-09	0956	9°26.6' N	157°21.2' W	996	Subtropical N Pacific
014-HC	4-Apr-09	1019	7°43.0' N	157°1.5' W	20	Subtropical N Pacific
016-HC	5-Apr-09	1010	6°23.4' N	156°35.5' W	980	NECC
020-HC	13-Apr-09	0947	0°32.0' N	157°4.9' W	20	EUC
020-HC	13-Apr-09	1017	0°31.9' N	157°4.6' W	1084	EUC
024-HC	15-Apr-09	1022	2°29.2' S	155°52.1' W	522	SEC
026-HC	16-Apr-09	1023	4°7.1' S	155°17.9' W	555	SEC
027-HC	17-Apr-09	1002	4°49.2' S	155°17.9' W	959	SEC
031-HC	19-Apr-09	0959	7°56.3' S	154°48.4' W	871	Subtropical S Pacific
<b>Neuston Net</b>						
001-NT	28-Mar-09	1619	19°18.2' N	157°41.5' W	0	Subtropical N Pacific
002-NT	28-Mar-09	2341	19°06.1' N	157°39.6' W	0	Subtropical N Pacific
003-NT	29-Mar-09	1150	18°35.0' N	157°42.6' W	0	Subtropical N Pacific
004-NT	29-Mar-09	2335	17°35.5' N	157°43.7' W	0	Subtropical N Pacific
005-NT	30-Mar-09	1222	16°49.2' N	157°44.3' W	0	Subtropical N Pacific
006-NT	31-Mar-09	1201	14°44.3' N	157°30.4' W	0	Subtropical N Pacific
007-NT	31-Mar-09	2248	13°52.7' N	157°26.7' W	0	Subtropical N Pacific
008-NT	1-Apr-09	1158	12°50.7' N	157°25.7' W	0	Subtropical N Pacific
009-NT	1-Apr-09	2326	12°02.6' N	157°26.4' W	0	Subtropical N Pacific
010-NT	2-Apr-09	1211	11°10.3' N	157°30.5' W	0	Subtropical N Pacific
011-NT	2-Apr-09	2317	10°22.0' N	157°32.1' W	0	Subtropical N Pacific
012-NT	3-Apr-09	1151	9°24.6' N	157°22.9' W	0	Subtropical N Pacific
013-NT	3-Apr-09	2212	8°40.0' N	157°17.6' W	0	Subtropical N Pacific
014-NT	4-Apr-09	1102	7°42.3' N	157°01.8' W	0	Subtropical N Pacific
015-NT	4-Apr-09	2317	7°07.1' N	156°54.1' W	0	NECC
016-NT	5-Apr-09	1157	6°21.8' N	156°34.7' W	0	NECC
017-NT	5-Apr-09	2248	5°29.2' N	156°23.5' W	0	NECC
018-NT	12-Apr-09	1236	1°48.4' N	157°36.7' W	0	4nm NW of Kiritimati
019-NT	12-Apr-09	2223	1°16.0' N	157°18.7' W	0	NECC
020-NT	13-Apr-09	1158	0°31.4' N	157°03.5' W	0	EUC
021-NT	13-Apr-09	2248	0°03.4' S	156°44.2' W	0	EUC
022-NT	14-Apr-09	1114	0°54.4' S	156°25.0' W	0	EUC
023-NT	15-Apr-09	0036	1°45.8' S	156°08.1' W	0	EUC

Table 3 continued.

Station	Date	Local Time	Latitude	Longitude	Depth (m)	General Locale
024-NT	15-Apr-09	1130	2°30.9' S	155°52.9' W	0	SEC
025-NT	15-Apr-09	2211	3°20.7' S	155°35.5' W	0	SEC
026-NT	16-Apr-09	1136	4°08.1' S	155°18.4' W	0	SEC
027-NT	17-Apr-09	1147	4°49.7' S	155°19.1' W	0	SEC
029-NT	18-Apr-09	1123	6°35.8' S	154°56.6' W	0	Subtropical S Pacific
030-NT	18-Apr-09	2219	7°12.2' S	154°52.0' W	0	Subtropical S Pacific
031-NT	19-Apr-09	1132	7°56.8' S	154°50.2' W	0	Subtropical S Pacific
033-NT	26-Apr-09	1119	17°08.6' S	151°28.1' W	0	Subtropical S Pacific
034-NT	26-Apr-09	2251	17°20.9' S	150°52.6' W	0	Subtropical S Pacific
035-NT	27-Apr-09	1051	17°11.2' S	150°09.0' W	0	Subtropical S Pacific
036-NT	27-Apr-09	2236	17°02.5' S	150°10.4' W	0	Subtropical S Pacific
037-NT	28-Apr-09	1246	16°58.5' S	150°00.1' W	0	Subtropical S Pacific
038-NT	28-Apr-09	2203	16°54.6' S	150°05.4' W	0	Subtropical S Pacific
<b>Meter Net</b>						
013-MN	3-Apr-09	2201	8°40.3' N	157°17.7' W	25	Subtropical N Pacific
015-MN	4-Apr-09	2232	7°8.3' N	156°55.3' W	78	NECC
025-MN	15-Apr-09	2204	3°20.3' S	155°35.5' W	43	SEC
<b>2-Meter Net</b>						
038-MN	28-Apr-09	2332	16°54.8' S	150°1.8' W	534	Subtropical S Pacific
<b>Bathypotometer</b>						
002-BP	28-Mar-09	2237	19°06.6' N	157°39.5' W	100	Subtropical N Pacific
007-BP	31-Mar-09	2215	13°53.3' N	157°26.5' W	100	Subtropical N Pacific
009-BP	1-Apr-09	2230	12°04.1' N	157°25.7' W	100	Subtropical N Pacific
011-BP	2-Apr-09	2226	10°23.2' N	157°31.8' W	100	Subtropical N Pacific
015-BP	4-Apr-09	2148	7°08.9' N	156°55.4' W	100	NECC
017-BP	5-Apr-09	0000	5°29.8' N	156°23.7' W	100	NECC
019-BP	12-Apr-09	2150	1°16.9' N	157°18.9' W	100	NECC
021-BP	13-Apr-09	2212	0°03.0' S	156°44.3' W	100	SEC
028-BP	17-Apr-09	2207	5°17.0' S	155°20.2' W	100	SEC
030-BP	18-Apr-09	2150	7°11.8' S	154°51.7' W	100	Subtropical S Pacific

Table 4. Surface sampling station data (SS-XXX, XXX-HC, XXX-NT).

Station	Date	Latitude	Longitude	Temp. (°C) *	Salinity (ppt) *	Raw Flour.	>0.45 µm Chl a (µg/L) *	> 8 µm Chl a (µg/L) *	pH *	Carbonate Alkalinity (µmol/kg) *
001-NT	28-Mar-09	19°17.8' N	157°41.4' W	23.9	35.120	3.6	0.085	0.016		
002-NT	28-Mar-09	19°06.8' N	157°39.4' W	24.2	35.070	3.4	0.093	0.013		
003-HC	29-Mar-09	18°36.7' N	157°38.8' W	23.7	35.150	3.5	0.105	0.044	8.114	1961.971
SS-001	29-Mar-09	18°05.1' N	157°44.7' W	23.4	35.062	3.4			8.074	1634.388
004-NT	29-Mar-09	17°36.5' N	157°41.7' W	24.1	34.939	3.5	0.018	0.009		
SS-002	30-Mar-09	17°12.6' N	157°41.8' W	24.3	34.829	3.5			8.085	2140.225
005-HC	30-Mar-09	16°50.5' N	157°40.8' W	24.4	34.832	3.4	0.105	0.006	8.135	2126.056
SS-003	30-Mar-09	16°19.3' N	157°40.7' W	24.7	34.736	3.2			8.059	1453.771
006-HC	31-Mar-09	14°46.5' N	157°28.4' W	25.1	34.587	3.4	0.065	0.009	8.063	1944.854
SS-004	31-Mar-09	14°17.8' N	157°27.9' W	25.2	34.525	3.6			8.067	1936.695
007-NT	31-Mar-09	13°54.0' N	157°25.9' W	25.5	34.590	3.5	0.043	0.012		
SS-005	1-Apr-09	13°17.5' N	157°22.8' W	25.5	34.488	3.8			8.100	1927.737
008-HC	1-Apr-09	12°53.6' N	157°22.9' W	25.7	34.542	3.7	0.138	0.022	8.107	1948.986
SS-006	1-Apr-09	12°29.3' N	157°26.5' W	25.6	34.479	3.9			8.170	1843.332
009-NT	1-Apr-09	12°04.6' N	157°25.1' W	25.7	34.480	3.8	0.142	0.019		
SS-007	2-Apr-09	11°35.9' N	157°26.5' W	26.0	34.372	4.0			8.100	2089.464
010-HC	2-Apr-09	11°11.4' N	157°27.2' W	26.4	34.547	3.5	0.175	0.018	8.026	1981.449
011-NT	2-Apr-09	10°23.1' N	157°31.9' W	26.4	34.494	4.1	0.142	0.015		
SS-008	3-Apr-09	9°48.9' N	157°24.5' W	26.4	34.499	4.2			8.017	1883.943
012-HC	3-Apr-09	9°27.3' N	157°20.3' W	26.6	34.507	3.5	0.079	0.017	8.126	2068.805
SS-009	3-Apr-09	9°00.4' N	157°20.0' W	26.8	34.546	3.3			8.110	1866.943
013-NT	3-Apr-09	8°41.0' N	157°17.0' W	27.0	34.632	6.8	0.222	0.061		
SS-010	4-Apr-09	8°06.1' N	157°07.8' W	27.3	34.754	7.7			8.117	2000.337
014-HC	4-Apr-09	7°43.5' N	157°01.0' W	27.6	34.837	5.1	0.183	0.056		
015-NT	4-Apr-09	7°09.3' N	156°55.3' W	27.6	34.732	8.6	0.143	0.073		
SS-011	5-Apr-09	6°41.7' N	156°43.4' W	27.6	34.828	7.4			8.083	2124.288

\* blank spaces indicate no data collected

Table 4 continued.

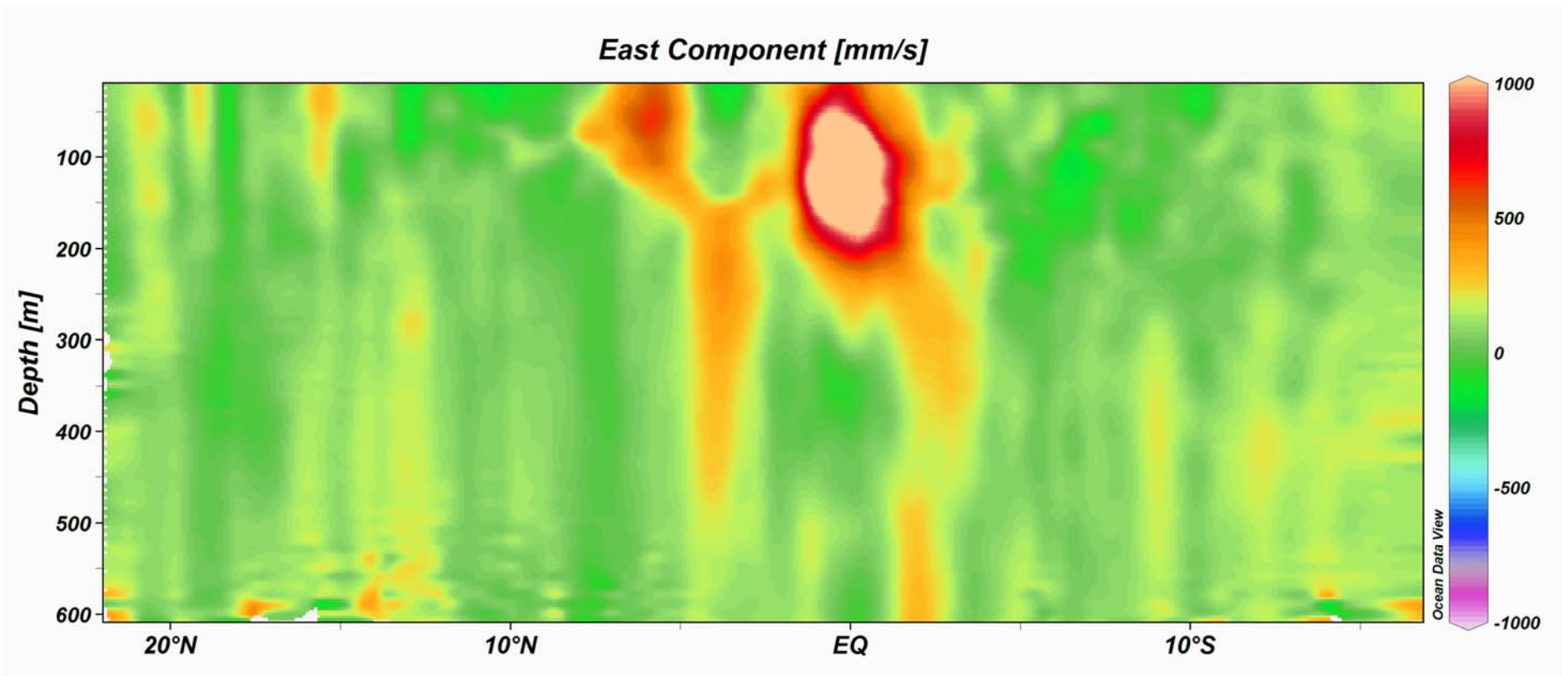
Station	Date	Latitude	Longitude	Temp. (°C) *	Salinity (ppt) *	Raw Flour.	>0.45 µm Chl a (µg/L) *	> 8 µm Chl a (µg/L) *	pH *	Carbonate Alkalinity (µmol/kg) *
016-NT	5-Apr-09	6°24.3' N	156°35.8' W	27.7	34.958	5.2	0.208	0.083		
SS-012	5-Apr-09	5°51.8' N	156°26.9' W	27.8	34.960	7.6			8.005	1986.761
017-NT	5-Apr-09	5°30.1' N	156°23.9' W	27.8	34.964	8.7	0.207	0.044		
018-NT	12-Apr-09	1°49.6' N	157°36.8' W	27.6	34.975	4.8	0.196	0.070		
SS-013	9-Apr-09	2°00.5' N	157°29.4' W						8.204	2062.903
SS-014	12-Apr-09	1°33.2' N	157°29.4' W	28.0	34.956	6.0			8.051	2103.400
019-NT	12-Apr-09	1°17.3' N	157°18.7' W	27.8	34.981	8.9	0.081	0.037		
SS-015	13-Apr-09	0°48.9' N	157°10.3' W	27.2	35.007	7.6			8.051	2487.300
020-HC	13-Apr-09	0°31.9' N	157°04.6' W	27.0	35.208	5.2	0.215	0.181	8.025	3044.500
SS-016	13-Apr-09	0°17.0' N	156°54.4' W	27.4	35.257	6.4			8.139	1978.500
021-NT	13-Apr-09	0°02.9' S	156°44.3' W	27.2	35.259	9.2	0.230	0.171		
SS-017	14-Apr-09	0°23.9' S	156°38.1' W	27.2	35.243	8.5			8.052	2236.400
022-NT	14-Apr-09	0°54.0' S	156°25.0' W	27.5	35.255	5.1	0.083	0.078		
023-NT	14-Apr-09	1°44.6' S	156°07.9' W	27.8	35.350	9.1	0.159	0.072		
SS-018	15-Apr-09	2°01.0' S	156°01.0' W	27.8	35.364	7.3			8.108	2236.400
024-HC	15-Apr-09	2°28.2' S	155°51.5' W	27.9	35.361	4.6	0.013	0.006	8.070	1822.100
SS-019	15-Apr-09	2°52.2' S	155°42.9' W	27.9	35.242	5.5			8.063	1868.100
025-NT	15-Apr-09	3°18.9' S	155°35.2' W	28.0	35.300	9.6	0.154	0.037		
SS-020	16-Apr-09	3°41.5' S	155°29.1' W	28.3	35.380	7.1			8.066	1822.083
SS-021	16-Apr-09	4°19.9' S	155°17.5' W	28.6	35.369	5.0			8.085	1803.786
SS-022	17-Apr-09	4°32.6' S	155°17.4' W	28.5	35.382	7.9			8.083	2295.459
027-HC	17-Apr-09	4°49.2' S	155°17.4' W	28.7	35.347	4.6	0.107	0.067	7.971	2079.127
SS-023	17-Apr-09	5°02.7' S	155°22.3' W	28.8	35.270	5.500			8.04	2019.815
SS-024	17-Apr-09	5°49.9' S	155°09.1' W	29.1	35.338	8.4			8.132	1666.849
029-NT	18-Apr-09	6°35.0' S	154°56.0' W	29.6	35.500	4.1	0.056	0.032		
SS-025	18-Apr-09	6°54.6' S	154°54.8' W	29.6	35.517	5.1			8.122	2023.947

\* blank spaces indicate no data collected

Table 4 continued.

Station	Date	Latitude	Longitude	Temp. (°C) *	Salinity (ppt) *	Raw Flour.	>0.45 µm Chl a (µg/L) *	> 8 µm Chl a (µg/L) *	pH *	Carbonate Alkalinity (µmol/kg) *
030-NT	18-Apr-09	7°11.5' S	154°51.3' W	29.4	35.560	8.3	0.101	0.057		
SS-026	19-Apr-09	7°32.8' S	154°48.2' W	29.3	35.518	8.2			8.116	1822.083
031-HC	19-Apr-09	7°55.8' S	154°47.4' W	29.4	35.621	4.7	0.009	0.110	8.121	1366.415
SS-027	19-Apr-09	8°12.5' S	154°59.4' W	29.7	35.675	5.1			8.163	2765.293
033-NT	26-Apr-09	17°08.6' S	151°28.7' W	29.4	35.91	3.0	0.098			
034-NT	26-Apr-09	17°19.8' S	150°52.6' W	29.2	36.13	3.2	0.004			
035-NT	27-Apr-09	17°11.2' S	150°09.5' W	29.2	36.13	3.6	0.049			
036-NT	27-Apr-09	17°02.7' S	150°11.0' W	29.1	36.10	3.2	0.040			
037-NT	28-Apr-09	16°58.5' S	149°59.6' W	29.2	36.16	3.1	0.033			
038-NT	28-Apr-09	16°54.6' S	150°05.3' W	29.1	36.14	3.2	0.045			

\* blank spaces indicate no data collected





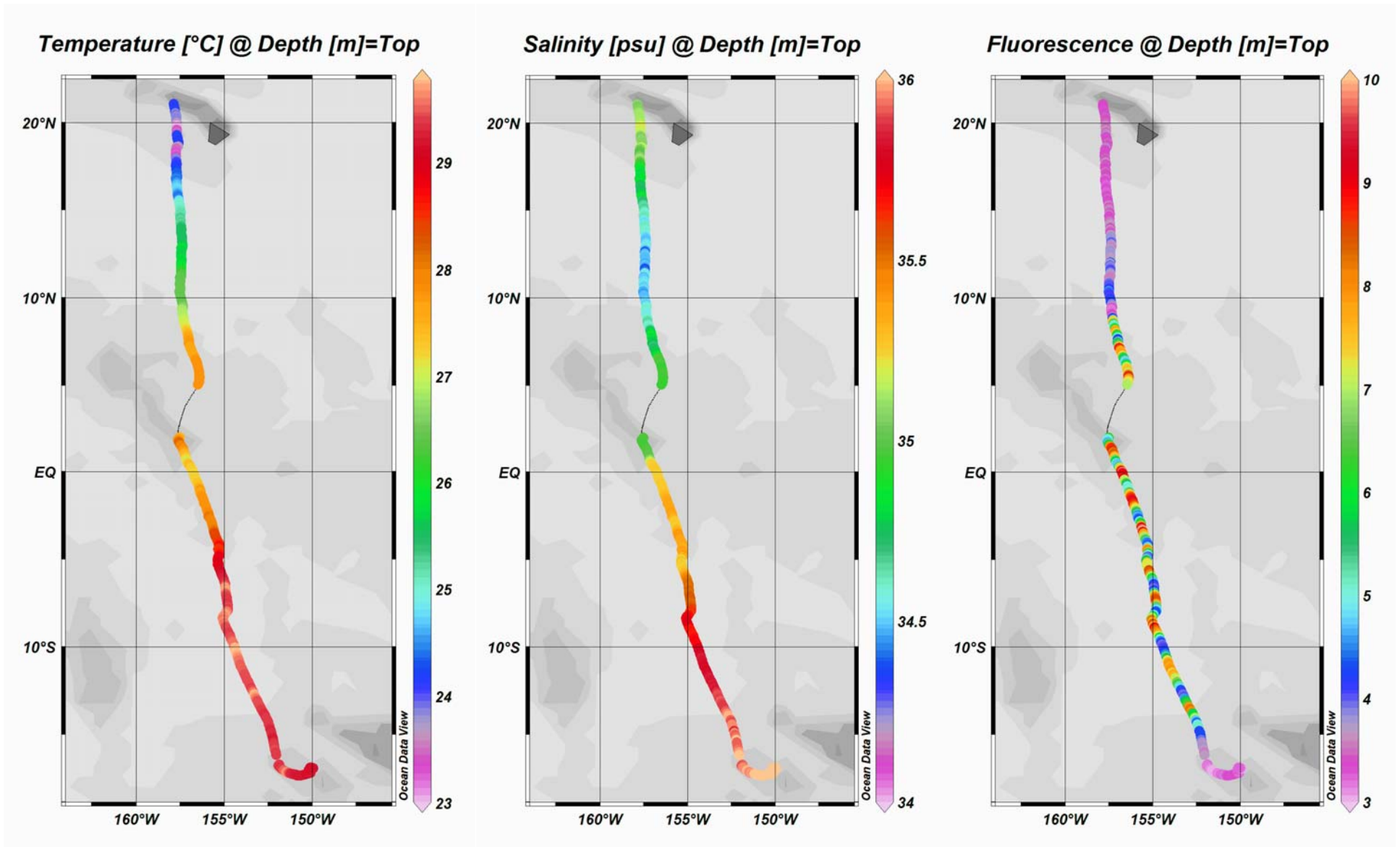


Figure 3. Surface temperature (left panel), salinity (middle panel) and fluorescence (right panel) measurements from the continuous flow-through data logger. Break in sampling north of Christmas Island due to delayed Kiribati research clearance.

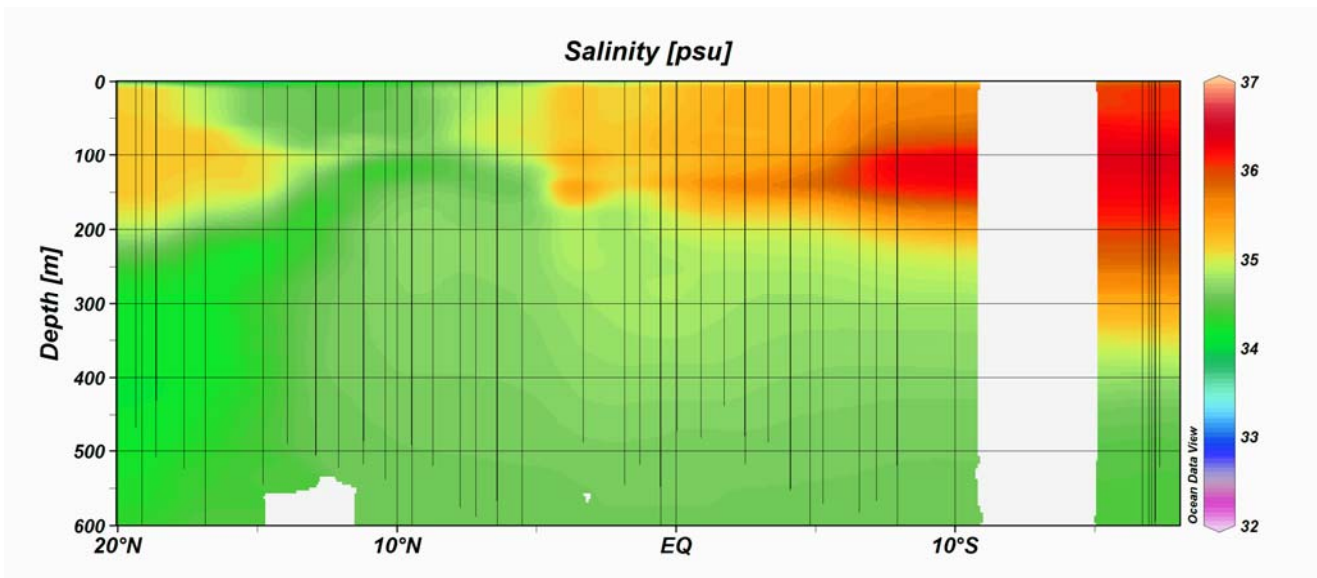
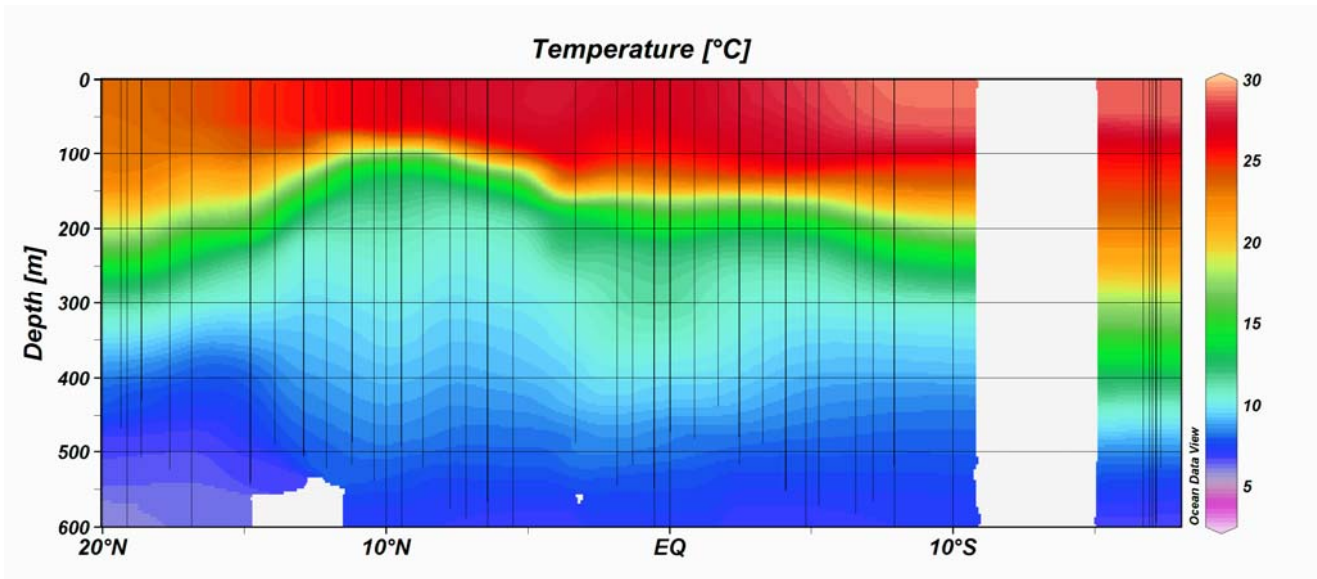


Figure 4. Temperature (upper panel) and salinity (bottom panel) cross sections created from CTD data collected along the entire cruise track.

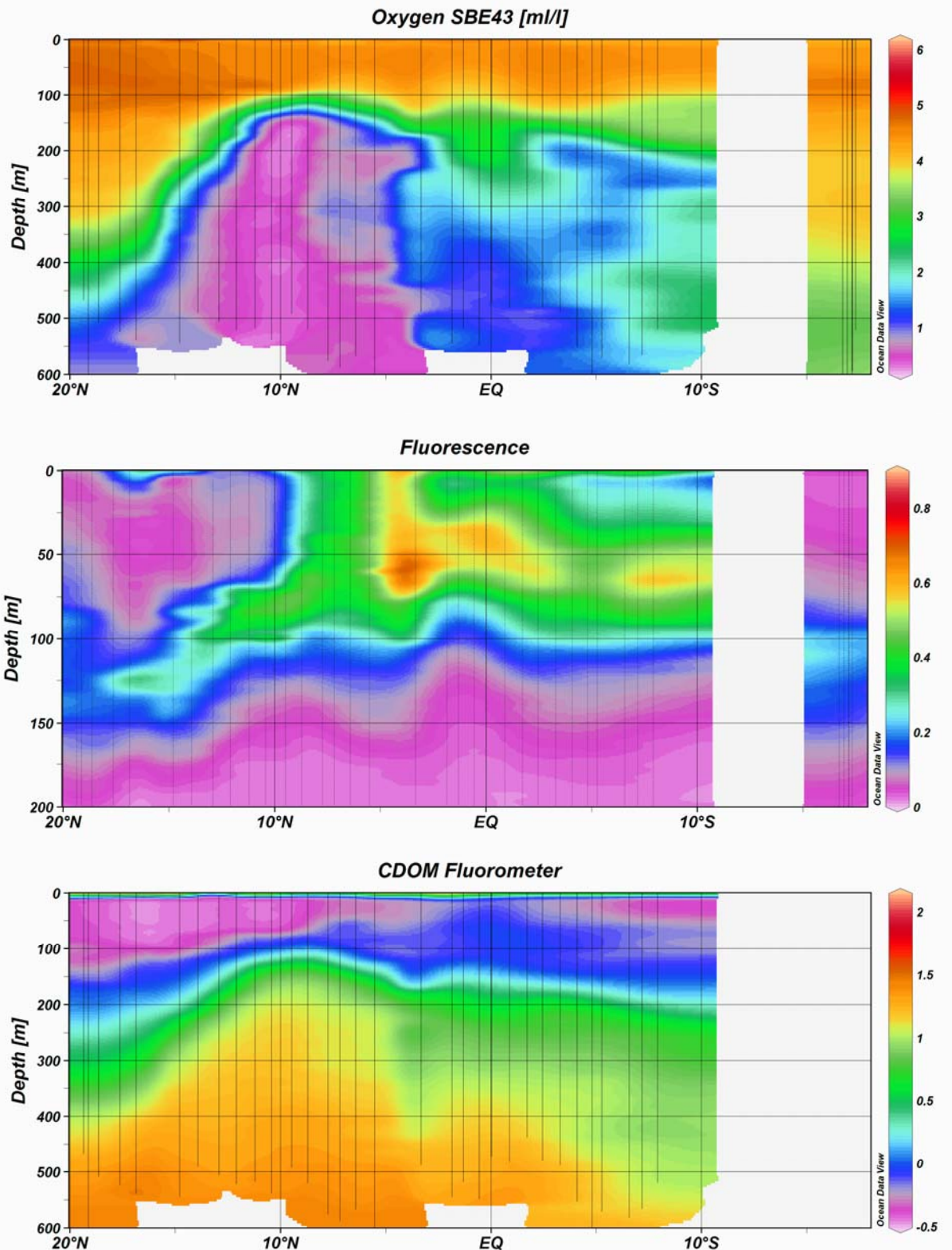


Figure 5. Oxygen (upper panel), raw fluorescence (middle panel), and CDOM fluorescence (lower panel) cross sections. The oxygen and fluorescence sensors are mounted on CTDs.

Table 5. Hydrocast bottle data.

Station	Bottle	Depth (m)	> 0.45 $\mu\text{m}$ Chl a ( $\mu\text{g/L}$ ) *	> 8 $\mu\text{m}$ Chl a ( $\mu\text{g/L}$ ) *	pH *	Carbonate Alkalinity ( $\mu\text{mol/kg}$ ) *
S222-003-HC	13	0.0	0.105	0.044	8.114	1962.0
S222-003-HC	12	66.1				
S222-003-HC	11	66.8				
S222-003-HC	10	68.0				
S222-003-HC	9	69.9				
S222-003-HC	8	70.1			8.154	2016.9
S222-003-HC	7	69.6				
S222-003-HC	6	393.5				
S222-003-HC	5	394.6				
S222-003-HC	4	395.8				
S222-003-HC	3	397.6				
S222-003-HC	2	398.3				
S222-003-HC	1	398.4			7.639	1708.8
S222-005-HC	13	0.0	0.105	0.006	8.135	2126.1
S222-005-HC	12	58.1				
S222-005-HC	11	58.6				
S222-005-HC	10	59.0				
S222-005-HC	9	60.9			8.160	1852.2
S222-005-HC	8	396.0				
S222-005-HC	7	397.7				
S222-005-HC	6	397.6				
S222-005-HC	5	397.1			7.564	2004.5
S222-005-HC	4	792.0				
S222-005-HC	3	793.9				
S222-005-HC	2	794.1				
S222-005-HC	1	794.4			7.591	1821.5
S222-006-HC	13	0.0	0.065	0.009	8.063	1944.8
S222-006-HC	12	DNF				
S222-006-HC	11	DNF				
S222-006-HC	10	DNF				
S222-006-HC	9	DNF				
S222-006-HC	8	DNF				
S222-006-HC	7	DNF				
S222-006-HC	6	394.2				
S222-006-HC	5	394.6				
S222-006-HC	4	394.3				2719.3
S222-006-HC	3	394.6				
S222-006-HC	2	396.7				
S222-006-HC	1	398.0			6.897	
S222-008-HC	13	0.0	0.138	0.022	8.107	1949.0
S222-008-HC	12	47.0				
S222-008-HC	11	47.7				
S222-008-HC	10	48.4				

\* blank spaces indicate no data collected, DNF = did not fire

Table 5 continued.

Station	Bottle	Depth (m)	> 0.45 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	> 8 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	pH *	Carbonate Alkalinity ( $\mu\text{mol/kg}$ ) *
S222-008-HC	9	48.9				
S222-008-HC	8	49.8			8.151	1808.5
S222-008-HC	7	50.9				
S222-008-HC	6	393.4				
S222-008-HC	5	365.0				
S222-008-HC	4	396.9				
S222-008-HC	3	397.1				
S222-008-HC	2	396.8				
S222-008-HC	1	397.7			7.359	1998.0
S222-010-HC	13	0.0	0.175	0.018	8.026	1981.4
S222-010-HC	12	DNF				
S222-010-HC	11	DNF				
S222-010-HC	10	DNF				
S222-010-HC	9	DNF				
S222-010-HC	8	DNF				
S222-010-HC	7	DNF				
S222-010-HC	6	396.0				
S222-010-HC	5	395.1				
S222-010-HC	4	394.5				
S222-010-HC	3	396.8				
S222-010-HC	2	399.5				
S222-010-HC	1	397.9				
S222-012-HC	13	0.0	0.079	0.017	8.126	2068.8
S222-012-HC	12	39.6			8.166	2103.0
S222-012-HC	11	41.3				
S222-012-HC	10	40.4				
S222-012-HC	9	79.9				
S222-012-HC	8	397.2				
S222-012-HC	7	397.8				
S222-012-HC	6	397.3				
S222-012-HC	5	397.5			7.567	2014.5
S222-012-HC	4	791.4				
S222-012-HC	3	791.8				
S222-012-HC	2	791.1				
S222-012-HC	1	792.9			7.585	2162.7
S222-014-HC	13	0.0	0.183	0.056	0.000	
S222-014-HC	12	5.3				
S222-014-HC	11	6.4				
S222-014-HC	10	5.4				
S222-014-HC	9	4.8				
S222-014-HC	8	6.1				
S222-014-HC	7	5.6				
S222-014-HC	6	5.9				

\* blank spaces indicate no data collected, DNF = did not fire

Table 5 continued.

Station	Bottle	Depth (m)	> 0.45 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	> 8 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	pH *	Carbonate Alkalinity ( $\mu\text{mol/kg}$ ) *
S222-014-HC	5	6.3				
S222-014-HC	4	5.8				
S222-014-HC	3	6.7				
S222-014-HC	2	5.1				
S222-014-HC	1	5.2				
S222-016-HC	13	0.0	0.208	0.083	8.116	2124.3
S222-016-HC	12	24.4				
S222-016-HC	11	24.9				
S222-016-HC	10	25.2			8.162	2069.4
S222-016-HC	9	80.2				
S222-016-HC	8	395.3				
S222-016-HC	7	397.3				
S222-016-HC	6	398.0				
S222-016-HC	5	397.9			7.488	2028.7
S222-016-HC	4	791.0				
S222-016-HC	3	793.2				
S222-016-HC	2	795.5				
S222-016-HC	1	794.2			7.591	2129.0
S222-020-HC	13	0.0	0.215	0.181	8.025	3044.500
S222-020-HC	12	52.6				
S222-020-HC	11	54.5				
S222-020-HC	10	55.6				
S222-020-HC	9	59.6			8.054	2559.3
S222-020-HC	8	59.6				
S222-020-HC	7	59.8				
S222-020-HC	6	395.4				
S222-020-HC	5	397.0				
S222-020-HC	4	398.5			7.537	1774.2
S222-020-HC	3	793.1				
S222-020-HC	2	794.1				
S222-020-HC	1	795.0			7.517	3259.3
S222-024-HC	13	0.0	0.013	0.006	8.070	1822.1
S222-024-HC	12	56.0				
S222-024-HC	11	52.1				
S222-024-HC	10	58.1				
S222-024-HC	9	58.9				
S222-024-HC	8	59.8				
S222-024-HC	7	60.7			8.066	1892.300
S222-024-HC	6	393.3				
S222-024-HC	5	395.1				
S222-024-HC	4	396.9				
S222-024-HC	3	397.1				
S222-024-HC	2	396.1				

\* blank spaces indicate no data collected, DNF = did not fire

Table 5 continued.

Station	Bottle	Depth (m)	> 0.45 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	> 8 $\mu\text{m}$ Chl <i>a</i> ( $\mu\text{g/L}$ ) *	pH *	Carbonate Alkalinity ( $\mu\text{mol/kg}$ ) *
S222-024-HC	1	397.0			7.584	1967.900
S222-026-HC	13	0.0	0.135	0.044	8.105	1822.083
S222-026-HC	12	44.3				
S222-026-HC	11	46.2				
S222-026-HC	10	48.6				
S222-026-HC	9	48.9				
S222-026-HC	8	48.6			8.034	1822.083
S222-026-HC	7	49.8				
S222-026-HC	6	392.4				
S222-026-HC	5	394.5				
S222-026-HC	4	395.0				
S222-026-HC	3	395.4				
S222-026-HC	2	395.8				
S222-026-HC	1	397.3			7.548	1822.083
S222-027-HC	13	0	0.107	0.135	7.971	2012.732
S222-027-HC	12	57.8				
S222-027-HC	11	58				
S222-027-HC	10	59.4			8.119	1822.083
S222-027-HC	9	79.5				
S222-027-HC	8	396.2				
S222-027-HC	7	396				
S222-027-HC	6	395.2				
S222-027-HC	5	396.5			7.672	1822.083
S222-027-HC	4	792.9				
S222-027-HC	3	793.4				
S222-027-HC	2	794.2				
S222-027-HC	1	794.5			7.547	1826.215
S222-031-HC	13	0.0	0.009	0.110	8.121	2012.732
S222-031-HC	12	23.4				
S222-031-HC	11	24.6			8.167	1948.986
S222-031-HC	10	25.2				
S222-031-HC	9	50.4				
S222-031-HC	8	396.2			7.653	1853.957
S222-031-HC	7	396.4				
S222-031-HC	6	369.3				
S222-031-HC	5	397.3				
S222-031-HC	4	791.4				
S222-031-HC	3	792.2				
S222-031-HC	2	794.3				
S222-031-HC	1	794.9			7.614	2013.913

\* blank spaces indicate no data collected, DNF = did not fire

Table 6. Neuston net tow data.

Station	Tow Area (m <sup>2</sup> )	Zoop. Biomass (ml)	Zoop. Density (ml/m <sup>2</sup> )	Gelatinous Zoop. Biomass (>2 cm)	Micronekton Biomass (>2 cm)	Plastic Pcs (#)
S222-001-NT	2332.9	11.7	0.0050	1	0	0
S222-002-NT	1121.8	5.5	0.0049	24	2	0
S222-003-NT	2299.5	14.5	0.0063	1.2	0.2	7
S222-004-NT	1120.3	30	0.0268	7.5	0	0
S222-005-NT	2182.0	1.5	0.0007	0	0	1
S222-006-NT	2881.6	1.5	0.0005	0	0	0
S222-007-NT	2691.5	1.5	0.0006	0	0.5	0
S222-008-NT	2809.0	3	0.0011	0	0	0
S222-009-NT	2327.3	10	0.0043	8	3.2	0
S222-010-NT	1196.7	2.8	0.0023	16	0	0
S222-011-NT	1737.8	7.5	0.0043	5	2	0
S222-012-NT	2071.8	1.5	0.0007	0.5	0	0
S222-013-NT	820.4	18	0.0219	6.5	3	0
S222-014-NT	2370.6	12	0.0051	45	0	0
S222-015-NT	2037.4	30	0.0147	10	0	0
S222-016-NT	2242.0	9	0.0040	0.4	0	0
S222-017-NT	2422.5	32	0.0132	5	1	0
S222-018-NT	1789.0	3.3	0.0018	4	0	0
S222-019-NT	2553.9	26	0.0102	22	3	0
S222-020-NT	1858.3	3	0.0016	0.8	0.1	0
S222-021-NT	1816.0	24.5	0.0135	21	1.5	0
S222-022-NT	1680.4	11.8	0.0070	0	0	0
S222-023-NT	2586.3	24	0.0093	4	2.5	0
S222-024-NT	2259.3	32	0.0142	1.1	0	0
S222-025-NT	2219.4	14	0.0063	18	2	0
S222-026-NT	2375.9	18	0.0076	3	0	1
S222-027-NT	1748.1	3	0.0017	5	0	0
S222-029-NT	2446.6	9	0.0037	0	0.05	1
S222-030-NT	1539.5	35	0.0227	16	5	0
S222-031-NT	1908.3	13	0.0068	2.5	8	0
S222-033-NT	1792.3	3.6	0.0020	0	0	0
S222-034-NT	1846.0	5	0.0027	12	0.5	0
S222-035-NT	1353.5	5.5	0.0041	0.2	0.1	0
S222-036-NT	1554.5	16	0.0103	25	0	0
S222-037-NT	2349.7	4	0.0017	0	0	0
S222-038-NT	1032.7	7	0.0068	7	4	0



Table 7. 2-Meter net tow data.

<b>Station</b>	<b>Tow Depth (m)</b>	<b>Net Diameter (m<sup>2</sup>)</b>	<b>Tow Volume (m<sup>3</sup>)</b>	<b>Mesh Size (μm)</b>	<b>Zoop. Biomass (ml)</b>	<b>Zoop. Density (ml/m<sup>3</sup>)</b>
S222-013-MN	25	0.785	1597	335	84.0	0.05259
S222-015-MN	78	0.785	1437	335	110.0	0.07653
S222-025-MN	43	0.785	1164	335	152.0	0.13055
S222-038-MN	534	2.49	11287	1000	70.0	0.00620