Cruise Report

C-209

Scientific Data Collected Aboard
SSV *Corwith Cramer*

Key West, FL – Samana, Dominican Republic –
Port Antonio, Jamaica – Key West, FL

13 February – 22 March 2007

Sea Education Association
Woods Hole, Massachusetts

To obtain unpublished data, contact the SEA data archivist:
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Table of Contents

Ship's Company

SSV *Corwith Cramer*, Cruise C-209

Nautical Staff	
David Bank	Captain
Jason Quilter	Chief Mate
Tim Frush	Second Mate
Matt Glenn	Third Mate
Seth Murray	Engineer
Tia Leo	Steward
Scientific Staff	
Amy Siuda	Chief Scientist
Matt Lambert	First Assistant Scientist
Jane McCamant	Second Assistant Scientist
Patrick Curran	Third Assistant Scientist
Students	
Donata Banyte	International University of Bremen
Emma Bishop	Oberlin College
T. Joseph Brown	Carleton College
Nicholas Cavanaugh	University of Pennsylvania
Maya Choy-Sutton	Columbia University
Kara Culgin	Colgate University
Colleen Detjens	Lawrence University
Abigail Dominy	Drexel University
Christopher (C'pher) Gresham	George Washington University
Sarah Jackson	College of the Atlantic
Christopher Laumer	Lawrence University
Victoria Leavitt	University of New Hampshire
Ryan Mahoney	Dartmouth College
Daniel Mancilla Cortez	College of the Atlantic
Kelsey Nickles	University of Pennsylvania
Jacqueline Perlow	Carleton College
Amanda Rook	Barnard College
Anna Studwell	Wellesley College
Michael Tillotson	Bowdoin College
Melissa White	Colgate University
Visitor	
Dr. William Bank	University of Pennsylvania School of Medicine

Introduction

This cruise report provides a summary of scientific activities aboard the SSV *Corwith Cramer* during cruise C-209 (13 Feb - 22 Mar 07). The 2785 nautical mile cruise served as the second half of a 12-week, semester 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, geological, 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 collected and results of student research projects contained in this report are not intended to represent final data interpretation and should not be excerpted or cited without written permission from SEA.

Favorable winds as we entered the Florida Straits off Key West allowed for a comprehensive introduction to the academic program (Table 2); students literally “learned the ropes” and became familiar with laboratory and deployment procedures. But, it is truly amazing how quickly wind and sea conditions change. A few days out, a passing cold front brought northerly winds while we sailed north in Gulf Stream between Florida and the Bahamas. Three knots of northerly flowing current met strong opposing winds, wave action increased and everyone was finally forced to *earn* their sea legs.

After traversing part of the deep Sargasso Sea, we arrived at Samana Bay, Domincan Republic where we had the opportunity to collect both surface and vertical profiles of temperature, salinity and nutrients for ECOMAR before dropping anchor for our first port stop. ECOMAR is a local Dominican organization that has recently collaborated with SEA to investigate the breeding and calving habitat of humpback whales.

We then continued the surface sampling efforts on Silver Bank during the first days following our departure from Samana. Silver Bank is truly magical. Although our visit to the Bank was plagued by persistent force 4 winds, we were welcomed by a pair of rather curious humpbacks that circled the *Corwith Cramer*, dove under her stern, and scratched their backs on the bobstay as two students were splayed on the bowsprit less than 10 feet above. Later that night, we were lulled to sleep as the distant singing of the humpbacks passed through the hull.

The final leg of our voyage, through the Yucatan Straits from Jamaica to Key West, was arduous at times, but an outstanding staff coupled with a group of enthusiastic and inquisitive students made C-209 a great success. Thank you.

Amy NS Siuda
Chief Scientist, C-209

Table 1. Student research projects, C-209.

Title	Student Investigator(s)
Variability of Eighteen Degree Water in the Southern Sargasso Sea.	Donata Banyte C'pher Gresham
Vertical distribution of phytoplankton pigments from the Straights of Florida to the Sargasso Sea and the Caribbean Basin.	Emma Bishop
The relationship between inorganic nutrients and phytoplankton growth in the South Sargasso and North Caribbean Seas along the cruise track of the *S.S.V Corwith Cramer*.	Joseph Brown
An observational analysis of freshwater flow from the Yuna and Barracote Rivers and its impact on current, salinity and temperature of Samana Bay's estuarine environment.	Nicholas Cavanaugh
Impacts of microzooplankton grazing on phytoplankton population growth: off the coast of Key West, Florida, Samana, Dominican Republic and in the Sargasso Sea.	Maya Choy-Sutton
Grain size and sediment composition in Samana Bay, Dominican Republic.	Kara Culgin Kelsey Nickles
The distribution and concentration of pelagic and coastal pollutants in the Caribbean as they relate to currents and shipping lanes.	Colleen Detjens Jacqueline Perlow Amanda Rook
The distribution and health of Myctophid fish in sub-tropical and tropical faunal regions along the C-209 cruise track.	Abigail Dominy
The deep Sound Fixing and Ranging Channel.	Sarah Jackson Melissa White
Quantification of intraspecific morphological variability in Chaetognatha of the Caribbean region.	Christopher Laumer
Chlorophyll *a* distribution and its limiting factors.	Victoria Leavitt Ryan Mahoney
Effect of water temperature and salinity on antennule length of Calanoid copepods.	Daniel Mancilla Cortez
The variation of mesopelagic biomass and biodiversity along the 209 cruise track of the *S.S.V. Corwith Cramer.*	Anna Studwell Michael Tillotson

Table 2. Academic Program.

Date	Topic	Speaker(s)
14 Feb	Introduction to Academic Program	D. Bank & A. Siuda
15 Feb	Tacking	M. Glenn
16 Feb	Practical Water Chemistry Introduction to Sextants	Assistant Scientists D. Bank
19 Feb	Line Chase	All Hands
20 Feb	Project Descriptions	Students
21 Feb	Gybing	All Hands
22 Feb	Radar Navigation	J. Quilter
23 Feb	Creature Features I	Students
1 Mar	Tacking	D. Bank
2 Mar	Data Discussion I	Students
6 Mar	Lab Practical Exam	Students
7 Mar	Chase the Buoy	Students
8 Mar	Caribbean Geology	M. Lambert
9 Mar	Creature Features II	Students
12 Mar	Tacking/Gybing Refresher	Students
13 Mar	Data Discussion II	Students
14 Mar	Introduction to Non-Instrument Navigation	D. Bank
15 Mar	Bosun Skill	T. Frush
16 Mar	Oceanography Poster Session	Students
19 Mar	Navigational Lights	T. Frush
20 Mar	Summary: Oceanographic Research	A. Siuda

Data Description

This section provides a record of data collected aboard the SSV *Corwith Cramer* cruise C-209 (US State Department Cruise: 2006-082) on a general circumnavigation of the Bahamas and Cuba (Figure 1). Ports of call included Samana, Dominican Republic and Port Antonio, Jamaica.

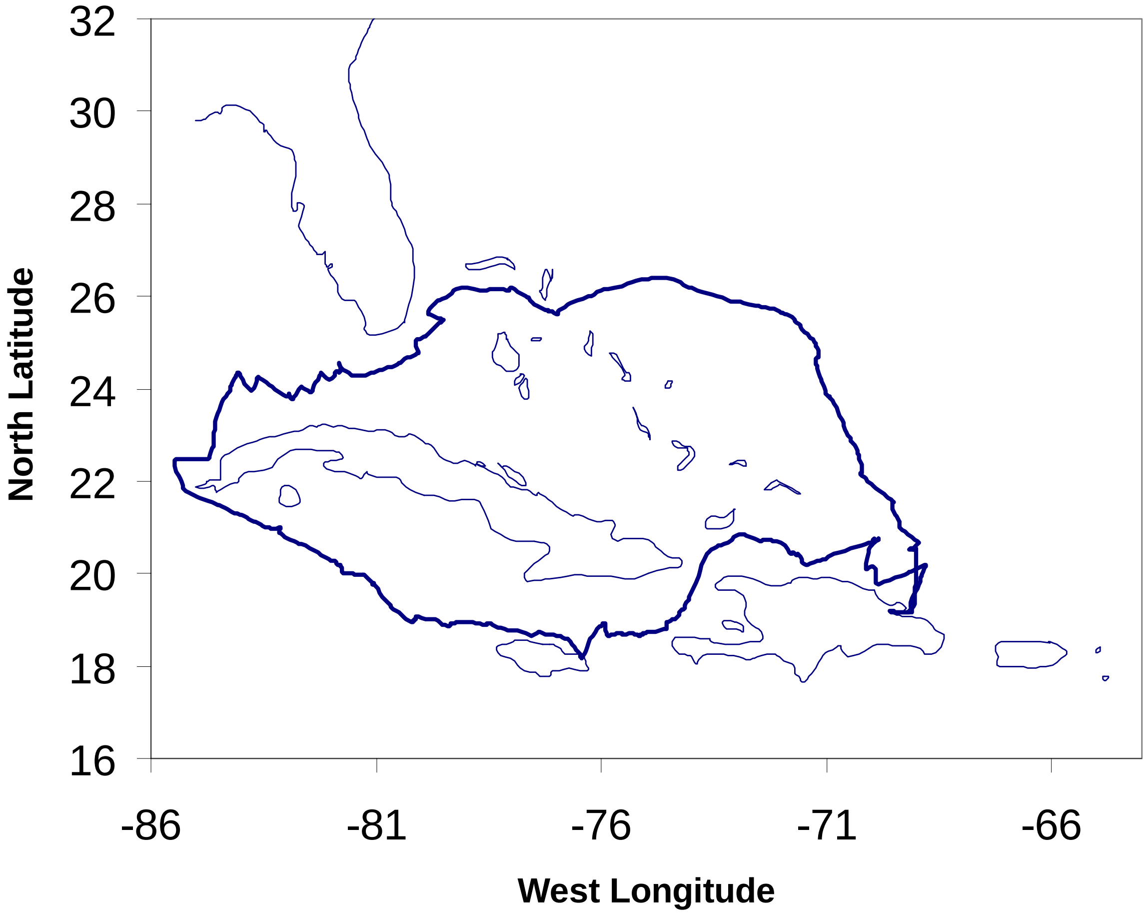

Figure 1. Hourly positions along the C-209 cruise track.

During the six-week voyage, we sampled at 91 discrete oceanographic sampling stations (Table 3). A total of 53 surface sampling stations were conducted during the first two legs of the voyage (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 (seawater flow-through system, Figure 3). Discrete CTD measurements of vertical temperature and salinity profiles are presented in Figure 4. Summaries of sea surface and water column chemical and biological properties are found in Tables 4-7, while a summary of sediment grain size distribution is found in Table 8. 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.

Station	Date	Local Time	Log * (nm)	Latitude (N)	Longitude (W)	Depth (m)	General Locale
CTD							
005	15-Feb-07	2046	53.3	24°57.6'	80°7.1'	26	Florida Straits
011	17-Feb-07	2045	254.7	25°40.1'	77°7.4'	1986	NE Providence Channel
014	18-Feb-07	1415	354.9	26°18.2'	75°18.3'	215	S Sargasso Sea
015	19-Feb-07	0824	473.2	25°53.2'	73°1.3'	1934	S Sargasso Sea
018	20-Feb-07	1040	574.8	24°41.8'	71°11.2'	1022	S Sargasso Sea
025	22-Feb-07	1026	786.5	21°32.9'	69°30.6'	2167	S Sargasso Sea
046	24-Feb-07	2037	Anchor	19°12.0'	69°36.1'	15	NW Samana Bay
062	2-Mar-07	0919	1087.9	20°02.9'	69°8.1'	2289	NE of Navidad Bank
071	5-Mar-07	1000	HB	20°26.2'	71°38.4'	2162	N of Monte Cristi
074	6-Mar-07	1020	1445.1	20°37.4'	73°18.3'	1774	SE of Great Ingua Island
080	8-Mar-07	2125	1648.2	18°55.3'	75°55.6'	2189	NE of Jamaica
085	13-Mar-07	2126	1899.3	18°51.1'	79°20.7'	2047	NW of Jamaica
087	14-Mar-07	0945	HB	19°02.8'	80°6.3'	2580	S of Little Cayman
089	15-Mar-07	1051	HB	19°58.9'	81°17.3'	2201	N of Grand Cayman
Hydrocast							
003	15-Feb-07	1152	27.0	24°34.2'	80°28.7'	237	Florida Straits
009	17-Feb-07	1042	221.7	25°58.3'	77°38.4'	248	NW Providence Channel
016	19-Feb-07	1730	522.9	25°38.7'	72°0.2'	561	S Sargasso Sea
028	23-Feb-07	1112	865.0	20°32.7'	69°4.2'	690	E of Turks and Caicos
033	24-Feb-07	0723	968.0	19°09.7'	69°11.0'	42	Canadaqua Bank, Samana Bay
034	24-Feb-07	0802	HB	19°09.4'	69°12.5'	100	Whale Hole, Samana Bay
036	24-Feb-07	0925	HB	19°10.6'	69°17.1'	Lost	Cayo Levantado, Samana Bay
056	25-Feb-07	1102	HB	19°10.5'	69°30.6'	25	W Basin Samana Bay
058	25-Feb-07	1346	HB	19°10.6'	69°17.0'	23	Cayo Lenantado, Samana Bay
068	4-Mar-07	1356	1246.3	20°40.5'	70°2.9'	315	S of Silver Bank
078	8-Mar-07	1139	1616.1	18°41.3'	75°32.5'	347	E of Formigas Bank
Neuston Net							
001	14-Feb-07	1603	9.5	24°21.9'	81°39.9'	0	Key West
002	15-Feb-07	0028	13.2	24°19.5'	81°08.5'	0	Key West
004	15-Feb-07	1245	27.2	24°35.2'	80°26.9'	0	Florida Straits
006	16-Feb-07	2359	63.1	25°07.1'	79°56.7'	0	Florida Straits
007	16-Feb-07	1208	121.1	25°53.1'	79°38.3'	0	Gulf Stream (E of Miami)
008	17-Feb-07	0212	199.0	26°09.7'	78°02.4'	0	NW Providence Channel
010	17-Feb-07	0000	221.7	25°58.7'	77°37.7'	0	NW Providence Channel
012	18-Feb-07	0019	257.8	25°37.9'	76°58.5'	0	NE Providence Channel
013	18-Feb-07	0051	258.4	25°38.6'	76°58.7'	0	NE Providence Channel
017	20-Feb-07	0228	544.5	25°18.4'	71°33.5'	0	S Sargasso Sea
019	20-Feb-07	1240	573.5	24°36.9'	71°14.9'	0	Southern Sargasso Sea
021	21-Feb-07	0111	624.1	23°48.6'	70°55.7'	0	Sargasso Sea

* HB = taffrail log was hove back (out of water)

Table 3 continued.

Station	Date	Local Time	Log * (nm)	Latitude (N)	Longitude (W)	Depth (m)	General Locale
Neuston Net cont.							
022	21-Feb-07	0143	625.2	23°47.5'	70°55.0'	0	Sargasso Sea
023	21-Feb-07	1220	680.9	22°54.5'	70°27.8'	0	S Sargasso Sea
024	22-Feb-07	0022	726.8	22°10.8'	70°13.6'	0	S Sargasso Sea
026	22-Feb-07	1225	786.7	21°32.1'	69°31.8'	0	E of Turks and Caicos
027	22-Feb-07	2330	816.4	21°01.6'	69°23.3'	0	N of Silver Bank
029	23-Feb-07	1220	864.8	20°33.1'	69°05.5'	0	E of Turks and Caicos
057	25-Feb-07	1141	HB	19°10.1'	69°28.1'	0	Samana Bay
060	1-Mar-07	1302	979.0	19°10.7'	69°09.1'	0	Canadaiqua Bank
061	2-Mar-07	0219	1047.1	19°57.4'	68°53.6'	0	Navidad Bank
063	2-Mar-07	1124	1088.1	20°01.8'	69°10.9'	0	NW of Navidad Bank
064	2-Mar-07	1202	1090.2	20°00.7'	69°12.0'	0	NW of Navidad Bank
065	3-Mar-07	2357	1171.2	20°06.5'	70°05.6'	0	SW of Silver Bank
066	3-Mar-07	0029	1172.3	20°05.9'	70°07.2'	0	SW of Silver Bank
067	3-Mar-07	0630	1209.0	20°40.7'	69°57.8'	0	Edge of Silver Bank
069	4-Mar-07	1449	1246.6	20°40.2'	70°03.8'	0	S of Silver Bank
070	5-Mar-07	0036	1303.5	20°19.7'	71°00.6'	0	Silver Bank Passage
072	5-Mar-07	1148	1349.0	20°25.2'	71°39.2'	0	N of Monte Criste
073	6-Mar-07	0007	1401.5	20°43.6'	72°24.5'	0	NE of Haiti
075	6-Mar-07	1332	1446.4	20°36.5'	73°25.4'	0	N of Winward Passage
076	8-Mar-07	0020	1597.0	18°40.5'	75°07.1'	0	N of Navassa Island
079	8-Mar-07	1238	1616.6	18°42.0'	75°33.4'	0	E of Formigas Bank
081	8-Mar-07	2351	1649.2	18°55.3'	75°57.3'	0	NE of Jamaica
082	9-Mar-07	1143	1706.2	18°12.0'	76°27.6'	0	Port Antonio, Jamaica
083	13-Mar-07	0003	1786.2	18°44.4'	77°23.6'	0	N Jamaica
086	13-Mar-07	2341	1900.2	18°51.3'	79°23.12'	0	E of Cayman Trench
090	15-Mar-07	1259	HB	19°58.7'	81°18.2'	0	N of Grand Cayman
091	16-Mar-07	0003	HB	20°10.0'	81°47.1'	0	SE of Cuba
Meter Net							
008-2	17-Feb-07	0120	197.5	26°08.4'	78°04.0'	500	NW Providence Channel
017-2	20-Feb-07	0137	544.0	25°20.3'	71°34.5'	450	S Sargasso Sea
027-2	22-Feb-07	2236	816.0	21°03.1'	69°23.0'	677	N of Silver Bank
070-2	4-Mar-07	2344	1302.2	20°21.0'	70°58.9'	485	Silver Bank Passage
076-2	7-Mar-07	2328	1597.1	18°40.9'	75°06.3'	803	N of Navassa Island
076-1	8-Mar-07	0012	1597.1	18°40.6'	75°07.1'	50	N of Navassa Island
081-1	8-Mar-07	2322	1648.7	18°55.6'	75°56.5'	458	NE of Jamaica
Shipek Grab							
030	24-Feb-07	0602	HB	19°10.8'	69°10.4'	43	Canidaqua Bank
031	24-Feb-07	0627	HB	19°10.2'	69°10.5'	23	Canidaqua Bank
032	24-Feb-07	0638	HB	19°10.2'	69°10.36'	45	Canidaqua Bank
035	24-Feb-07	0843	HB	19°08.8'	69°14.6'	22	Samana Bay-Mouth
037	24-Feb-07	1022	HB	19°10.4'	69°21.7'	39	Samana Bay

* HB = taffrail log was hove back (out of water)

Table 3 continued.

Station	Date	Local Time	Log * (nm)	Latitude (N)	Longitude (W)	Depth (m)	General Locale
Shipek Grab cont.							
038	24-Feb-07	1047	HB	19°09.3'	69°22.5'	40	Samana Bay
039	24-Feb-07	1123	HB	19°09.0'	69°24.7'	29	Samana Bay
040	24-Feb-07	1153	HB	19°09.3'	69°26.7'	29	Samana Bay
041	24-Feb-07	1223	HB	19°09.0'	69°28.7'	30	Samana Bay
042	24-Feb-07	1249	HB	19°09.0'	69°30.8'	32	Samana Bay
043	24-Feb-07	1337	HB	19°11.8'	69°30.1'	31	Samana Bay
044	24-Feb-07	1418	HB	19°11.6'	69°32.0'	31	Samana Bay
045	24-Feb-07	1612	HB	19°11.8'	69°34.6'	25	Samana Bay
047	25-Feb-07	0655	HB	19°12.0'	69°36.0'	17	Samana Bay
048	25-Feb-07	0933	HB	19°10.2'	69°36.5'	16	Samana Bay
049	25-Feb-07	1016	HB	19°08.9'	69°34.2'	25	Samana Bay
059	25-Feb-07	1130	sm boat	19°28.0'	69°36.7'	27	Samana Bay
Fisher Scoop							
050	25-Feb-07	0804	sm boat	19°10.11'	69°37.2'	22	Samana Bay
051	25-Feb-07	0817	sm boat	19°09.5'	69°37.8'	14.7	Samana Bay
052	25-Feb-07	0841	sm boat	19°07.7'	69°37.4'	3.5	Samana Bay
053	25-Feb-07	0902	sm boat	19°06.53'	69°36.97'	13.8	Samana Bay
054	25-Feb-07	0925	sm boat	19°07.39'	69°36.1'	NA	Samana Bay
055	25-Feb-07	0938	sm boat	19°08.0'	69°36.7'	NA	Samana Bay

* HB = taffrail log was hove back (out of water)

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

Station	Date	Latitude (N)	Longitude (W)	Temp. (˚C)	Salinity (ppt)	PO_4 (μM) *	NO_2+NO_3 (μM) *	Chl *a* (μg/L) *
001	14-Feb-07	24°21.9'	81°39.7'	25.3	36.20	0.123	0.312	0.181
002	15-Feb-07	24°19.5'	81°08.3'	25.0	36.10	0.083	0.376	0.027
003	15-Feb-07	24°36.0'	80°25.3'	26.1	36.20	0.113	7.732	0.158
004	16-Feb-07	25°07.1'	71°56.7'	25.8	36.16	0.192	0.648	0.045
005	16-Feb-07	25°53.1'	79°38.3'	25.7	36.16	0.108	1.005	0.048
006	17-Feb-07	26°10.5'	78°01.6'	24.2	36.55	0.093	0.809	0.100
007	17-Feb-07	25°58.4'	77°38.3'	24.6	36.50	0.142	0.961	0.047
008	18-Feb-07	25°37.9'	76°58.5'	24.3	36.70	0.137	1.185	0.045
009	19-Feb-07	25°53.1'	73°00.8'	24.9	36.10	0.136	1.845	0.063
010	19-Feb-07	25°38.7'	72°10.2'	25.2	35.51	0.123	0.344	0.019
011	20-Feb-07	25°18.0'	71°33.1'	25.2	36.50	0.134	0.704	0.050
012	20-Feb-07	24°36.0'	71°15.2'	24.1	36.71	0.139	0.725	0.027
013	21-Feb-07	23°47.3'	70°54.8'	24.8	36.62	0.143	1.257	0.021
014	21-Feb-07	22°54.5'	70°27.8'	25.1	36.11	0.129	0.294	0.010
015	22-Feb-07	22°10.6'	70°13.7'	26.0	36.16	0.129	0.825	0.009
016	22-Feb-07	21°32.1'	69°31.9'	26.4	36.14	0.122	0.291	0.005
017	22-Feb-07	21°01.2'	69°23.4'	26.1	36.15	0.103	0.664	0.009
018	23-Feb-07	20°32.7'	69°04.2'	26.8	35.94	0.197	0.384	0.011
019	24-Feb-07	19°10.2'	69°10.3'	26.6	34.07	0.256	0.800	0.034
020	24-Feb-07	19°09.4'	69°12.5'	27.1	33.80	0.266	0.103	0.111
021	24-Feb-07	19°10.7'	69°17.1'	26.9	33.40			0.222
022	24-Feb-07	19°10.6'	69°19.5'	27.2	33.00	0.152	0.373	0.098
023	24-Feb-07	19°09.3'	69°26.8'	27.0	32.04	0.139	0.576	0.013
024	24-Feb-07	19°09.0'	69°30.8'	27.1	31.71	0.135	0.977	0.451
025	24-Feb-07	19°11.6'	69°11.2'	27.5	30.95	0.209	0.472	0.391
026	24-Feb-07	19°12.0'	69°12.1'	27.7	36.67	0.355	0.416	0.866
027	25-Feb-07	19°09.1'	69°09.4'	27.7	30.40	0.145	0.445	0.485
028	25-Feb-07	19°10.5'	69°10.6'	27.9	30.50	0.146	0.865	0.368
029	25-Feb-07	19°10.6'	69°10.0'	27.3	33.41			
030	3-Mar-07	20°06.4'	70°05.9'	26.9	36.15	0.087	0.343	-0.004
031	3-Mar-07	20°40.7'	69°57.8'	26.7	36.13	0.047	0.037	0.045
032	3-Mar-07	20°40.4'	69°58.6'	26.7	36.10	0.179	0.205	0.016
033	3-Mar-07	20°42.0'	69°57.7'	26.7	36.08	0.074	0.348	
034	3-Mar-07	20°43.5'	69°56.7'	26.7	36.10	0.028	0.103	0.000
035	3-Mar-07	20°44.7'	69°55.9'	26.6	36.02	0.028	-0.065	
036	3-Mar-07	20°44.9'	69°56.1'	26.7	36.10	0.054	-0.065	0.040
037	3-Mar-07	20°42.4'	69°56.8'	26.7	36.12	0.014	0.343	0.009
038	3-Mar-07	20°42.5'	69°57.0'	26.7	36.06	0.001	0.027	
039	3-Mar-07	20°44.4'	69°55.1'	26.2	36.08	0.034	0.027	0.020
040	3-Mar-07	20°43.5'	69°55.0'	26.7	36.09	0.014	-0.136	
041	3-Mar-07	20°40.7'	69°55.8'	26.7	36.11	0.225	0.574	0.017
042	3-Mar-07	20°42.1'	69°54.3'	26.7	36.02	0.067	0.231	
043	3-Mar-07	20°44.5'	69°51.6'	26.6	35.98	0.074	-0.564	-0.004
044	3-Mar-07	20°45.1'	69°52.4'	26.6	35.01	0.054	0.883	
045	3-Mar-07	20°45.3'	69°50.6'	26.7	36.01	0.008	0.063	0.053

* blank spaces indicate no data collected

Table 4 continued.

Station	Date	Latitude (N)	Longitude (W)	Temp. (˚C)	Salinity (ppt)	PO_4 (μM) *	NO_2+NO_3 (μM) *	Chl *a* (μg/L) *
046	4-Mar-07	20°40.5'	70°02.9'	26.9	36.20	0.120	0.806	0.012
047	5-Mar-07	20°19.7'	71°00.6'	26.6	36.18	0.107	0.241	0.006
048	5-Mar-07	20°25.0'	71°39.3'	27.2	36.07	0.074	-0.003	
049	6-Mar-07	20°43.9'	72°24.4'	27.7	35.98	0.087	0.256	-0.003
050	6-Mar-07	20°36.5'	73°25.4'	27.2	36.16	0.120	-0.034	0.003
051	8-Mar-07	18°40.5'	75°07.1'	27.5	35.84	0.126	0.017	0.005
052	8-Mar-07	18°41.3'	75°32.5'	27.2	35.90	0.074	1.076	-0.025
053	9-Mar-07	18°55.3'	75°57.4'	27.9	35.40	0.074	-0.187	-0.005

* blank spaces indicate no data collected

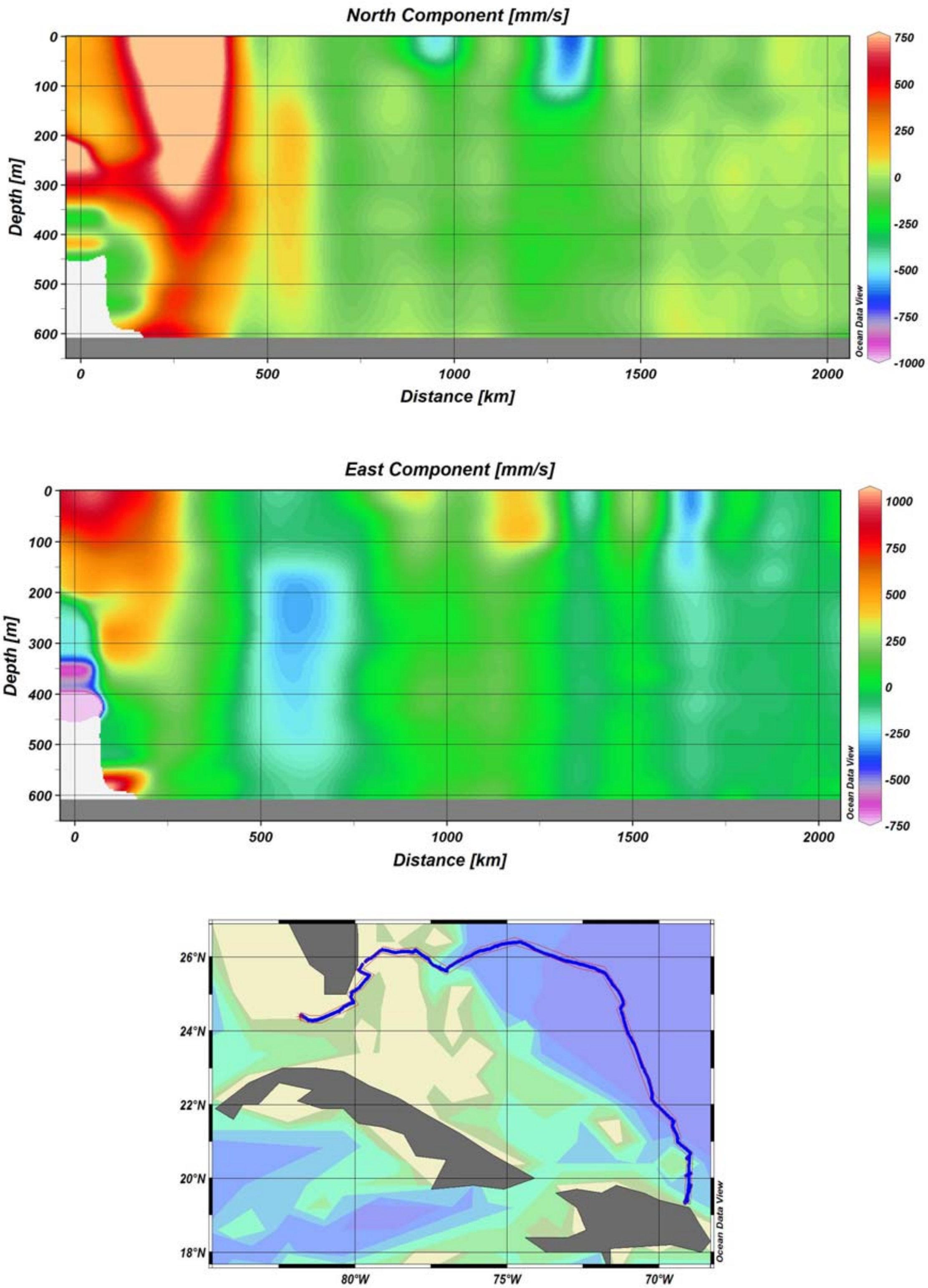

Figure 2. Cross section of current magnitude and direction created from ADCP data collected along the first leg of the cruise (lower panel). North component is shown in the upper panel and east component is shown in the middle panel.

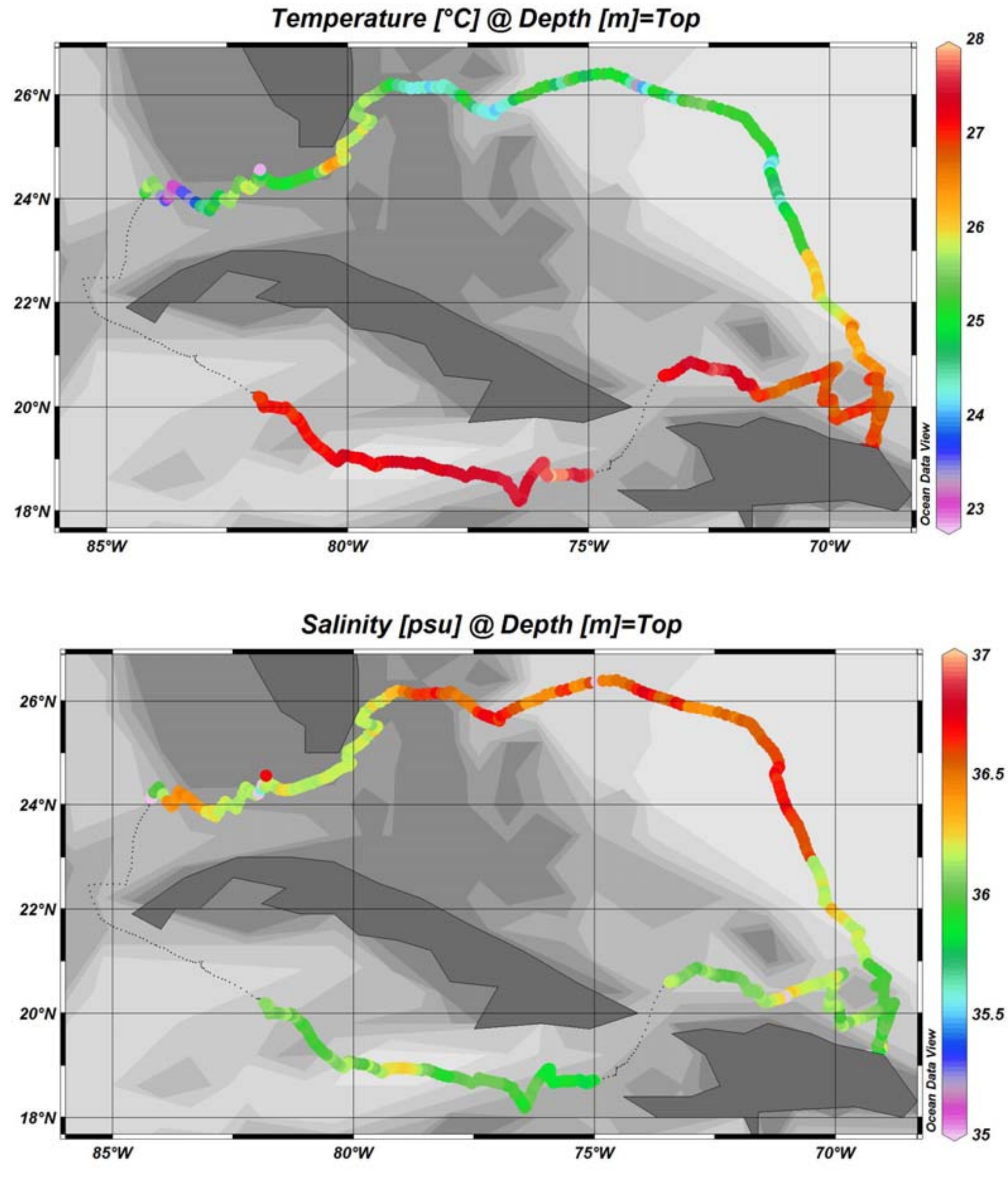

Figure 3. Surface temperature (upper panel) and salinity (lower panel) measurements from the continuous flow-through data logger. Data missing for regions in which research clearance was not requested or granted.

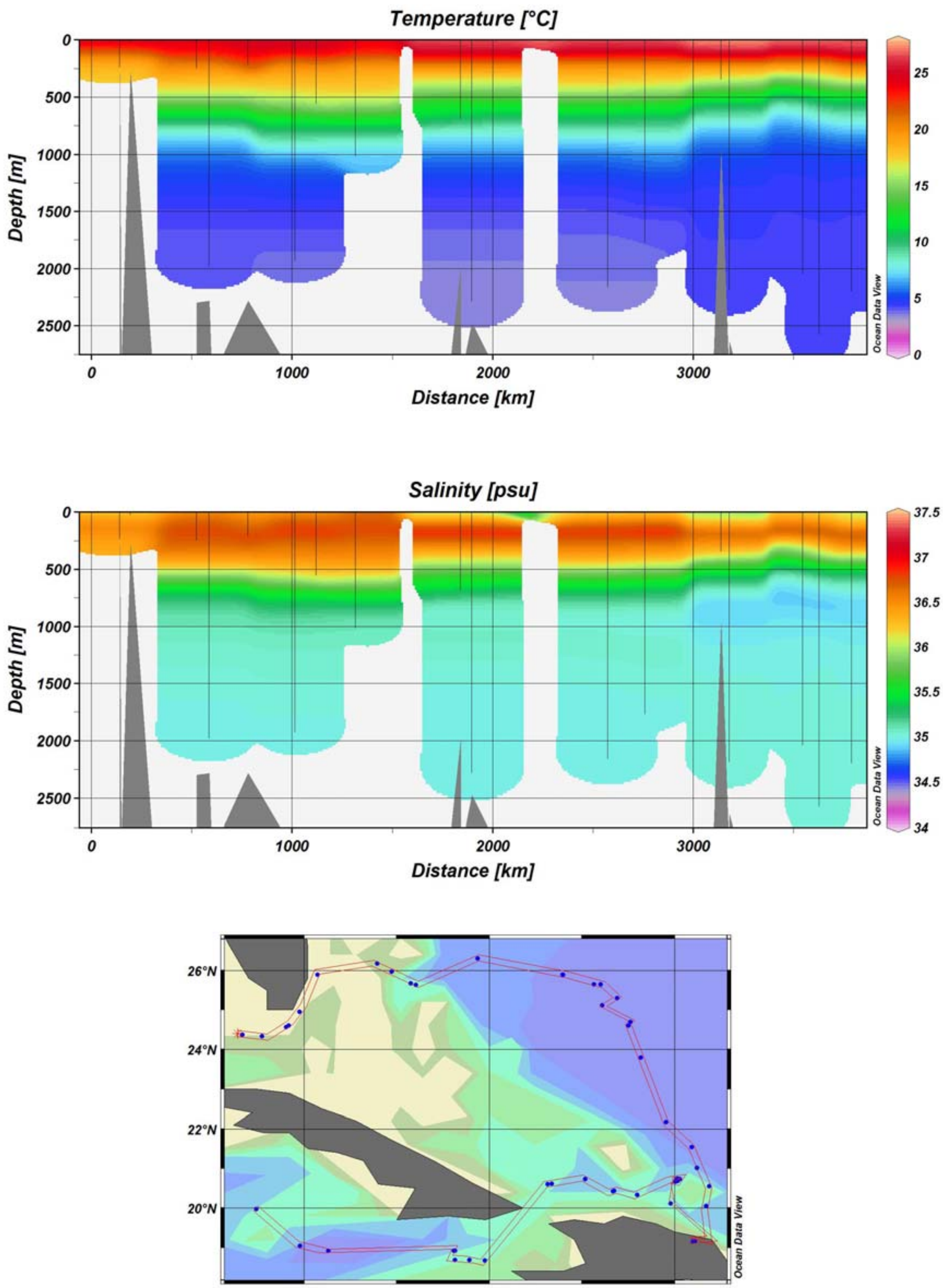

Figure 4. Temperature (upper panel) and salinity (middle panel) cross sections created from CTD data collected along the entire cruise track (lower panel).

Table 5. Hydrocast bottle data.

Station	Bottle	Depth (m)	PO_4 * (μM)	NO_2+NO_3 (μM)	SiO_2 (μM)	Chl *a* * (μg/L)
003	13	0.0	0.152	0.560	14.287	0.030
003	12	5.0	0.132	1.641	12.964	0.012
003	11	17.0	0.118	0.512	13.993	0.010
003	10	29.0	0.137	0.825	13.966	0.015
003	9	41.0	0.137	0.800	14.526	0.155
003	8	53.0	0.438	0.475	15.721	0.074
003	7	65.0	0.379	1.249	9.242	0.039
003	6	77.0	0.172	1.001	8.636	0.187
003	5	89.0	0.172	1.658	11.053	0.097
003	4	93.0	0.137	2.909	10.961	0.076
003	3	99.0	0.339	5.009	13.405	0.016
003	2	149.0	0.404	25.752	13.837	0.007
003	1	199.0	0.685	17.072	11.475	0.005
009	13	0.0	0.142	0.961	11.172	0.047
009	12	5.0	0.103	0.552	11.484	0.041
009	11	17.0	DNF	DNF	DNF	DNF
009	10	29.0	DNF	DNF	DNF	DNF
009	9	41.0	0.142	0.445	11.898	0.032
009	8	53.0	0.157	0.937	12.863	0.058
009	6	65.0	0.187	0.720	11.466	0.100
009	5	77.0	0.142	0.557	14.021	0.038
009	4	89.0	0.118	0.905	13.570	0.041
009	3	94.0	0.127	0.404	13.166	0.015
009	2	100.0	0.088	0.905	11.494	0.041
009	1	149.0	0.167	1.738	4.721	0.026
016	13	0.0	0.123	0.344	12.762	0.019
016	12	5.6	0.172		13.093	0.030
016	11	9.7	DNF	DNF	DNF	DNF
016	10	19.2	0.142	2.235	13.056	0.005
016	9	29.4	0.162	0.440	14.204	0.041
016	8	40.1	0.147	0.608	14.048	0.024
016	7	50.0	0.123	0.608	10.648	0.094
016	6	59.7	0.127	0.969	10.272	0.026
016	5	65.1	0.162	0.781	13.295	0.063
016	4	69.7	0.157	0.720	12.973	0.048
016	3	75.4	0.187	1.234	10.906	0.022
016	2	158.9	0.162	1.289	7.579	0.007
016	1	248.4	0.206	4.175	13.791	0.035
028	13	0.0	0.197	0.384	14.085	0.011
028	12	5.3	0.187	0.608	13.947	0.017
028	11	DNF	DNF	DNF	DNF	DNF
028	10	30.2	0.147	1.482	14.388	0.016
028	9	42.2	0.157	0.893	13.102	0.012
028	8	54.1	0.167	0.488	14.177	0.009
028	7	65.8	0.132	1.835	15.068	0.041
028	6	78.1	0.147	0.656	13.690	0.030

* blank spaces indicate no data collected; DNF = bottle did not fire

Table 5 continued.

Station	Bottle	Depth (m)	PO_4 * (μM)	NO_2+NO_3 (μM)	SiO_2 (μM)	Chl *a* * (μg/L)
028	5	89.6	0.221	0.239	15.031	0.029
028	4	93.8	0.211	0.037	14.002	0.221
028	3	99.0	0.172	0.328	15.087	0.084
028	2	174.1	0.157	1.794	5.502	0.049
028	1	248.7	0.300	5.826	13.506	0.001
033	13	0.0	0.266	0.103	16.906	0.111
033	6	5.6	0.211	-0.126	15.215	0.071
034	13	DNF	DNF	DNF	DNF	DNF
034	12	15.3	0.211	2.844	14.388	-0.009
034	11	20.2	0.182	-0.161	12.440	0.149
034	10	25.4	0.167	1.442	14.324	0.063
034	9	30.2	0.211	0.817	12.762	0.064
034	8	35.2	0.187	-0.090	14.204	0.152
034	7	40.1	0.162	1.137	14.462	0.121
034	6	50.0	0.177	1.289	14.186	0.071
034	5	60.1	0.162	1.217	15.188	0.149
034	4	70.1	0.192	0.567	11.843	0.018
034	2	79.9	0.167	1.057	12.504	0.067
034	1	0.0	0.266	0.103	16.906	0.111
056	13	0.0	0.192	0.865	17.650	0.368
056	12	4.2	0.280	0.552	17.476	-0.022
056	7	10.5	0.315	0.416	16.153	0.530
056	4	15.5	0.394	0.512	16.428	0.522
056	1	20.5	0.522	0.496	16.823	0.141
058	13	0.0	0.241	0.616	17.283	-0.059
058	9	5.5	0.290	0.857	16.934	-0.029
058	3	11.4	0.300	0.985		0.037
068	13	0.0	0.120	0.806	8.116	0.012
068	12	5.6	0.067	0.934	14.445	0.014
068	11	DNF	DNF	DNF	DNF	DNF
068	10	DNF	DNF	DNF	DNF	DNF
068	9	41.6	0.100	1.290	14.398	0.007
068	8	53.5	0.061	1.708	12.233	0.011
068	7	65.4	0.087	1.234	9.504	0.012
068	6	77.8	0.107	1.341	5.585	0.017
068	5	89.9	0.080	0.898	9.260	0.019
068	4	93.8	0.061	1.596	14.464	0.014
068	3	99.8	0.080	0.888	9.204	0.001
068	2	174.4	0.173	2.843	14.202	-0.001
068	1	248.1	0.225	5.175	12.036	-0.007
078	13	0.0		1.076	8.294	-0.025
078	12	5.2	0.028	1.865	14.108	-0.003
078	11	DNF	DNF	DNF	DNF	DNF
078	10	DNF	DNF	DNF	DNF	DNF
078	9	40.2	0.061	1.025	9.363	-0.015

* blank spaces indicate no data collected; DNF = bottle did not fire

Table 5 continued.

Station	Bottle	Depth (m)	PO_4 * (μM)	NO_2+NO_3 (μM)	SiO_2 (μM)	Chl *a* * (μg/L)
078	8	53.8	0.001	0.959	5.031	0.001
078	7	66.8	-0.005	0.460	10.864	0.002
078	6	78.1	-0.019	0.735	10.320	-0.005
078	5	89.3	0.054	0.888	14.033	-0.007
078	4	93.6	0.093	1.270	9.195	-0.011
078	3	99.5	0.067	1.687	9.767	0.003
078	2	174.5	0.324	3.897	4.816	-0.004
078	1	249.5	0.483	5.516	15.036	-0.006

* blank spaces indicate no data collected; DNF = bottle did not fire

Table 6. Neuston net tow data.

Station	Tow Length (m)	Temp. (°C)	Salinity (ppt)	Zoop. Biomass * (ml)	Zoop. Density * (ml/m^2)	Plastic Pellets * (#)	Plastic Pcs * (#)	Tar Pcs * (#)
001	926	25.2	36.19			0	0	0.0
002	2222.4	24.9	36.14	49.0	0.0220	0	7	0.0
004	185.2	26.0	36.18			0	0	0.0
006	2222.4	25.8	36.16	23.0	0.0100	0	1	0.0
007	2037.2	25.7	36.16	5	0.002	0	0	0.0
008	1296.4	24.3	36.58	12.0	0.0090	0	0	0.0
010	533	24.8	36.47	75.0	0.1400	0	6	0.0
012	926	24.3	36.70	4.0	0.0040	0	5	0.0
013	741	23.7	36.90	Chaet. Tow				
017	1248	25.2	36.50	4	0.0030	0	0	0
019	1666.8	24.1	36.70	11.0	0.0066	0	0	0.0
021	1111.2	24.7	36.60					
022	1481.6	24.7	36.60	4.0	0.0020	0	9	0.0
023	2778	26.0	36.80	1.0	0.0004	0	4	0.0
024	833	26.0	36.15	2.5	0.0030	0	0	0.0
026	555.6	26.4	36.14	7.0	0.0120	0	5	0.0
027	740.8	26.1	36.10	2.0	0.0027	0	1	0.0
029	1111.2	26.9	35.90	1.1	0.0010	1	1	0.0
057	1711	27.8	31.27					
060	555.6	27.6	34.80	Chaet. Tow				
061	1111.2	26.7	35.96	Chaet. Tow				
063	2222.4	26.9	36.05	2.0	0.0009	0	0	1.0
064	926	26.9	36.05	Chaet. Tow				
065	833	26.9	36.16	5.5	0.0060	0	0	0.0
066	0.45	26.9	36.15	Chaet. Tow				
067	926	26.7	36.13	Chaet. Tow				
069	1668.3	26.8	36.20	2.5	0.0015	0	3	0.0
070	1668.8	26.6	36.20	7.0	0.0040	0	0	0.0
072	1982	27.2	36.08	Cop. Tow				
073	2037.2	27.7	35.98	9.0	0.0040	0	0	0.0
075	2037	27.2	36.16	4.0	0.0020		6	
076	1065	27.5	35.80	5.0	0.0047	0	0	0.0
079	370	27.9	35.90	14.0	0.0380	0	16	0.0
081	185	27.6	35.86	22.0	0.1190	0	1	0.0
082	556	27.4	36.05	Chaet. Tow				
083	2037.2	27.4	36.02	13.0	0.0064	0	0	0.0
086	1852	27.2	36.23	8.0	0.0040	0	0	0.0
090	1950	27.0	36.04	0.5	0.0003	0	0	0.0
091	1852	26.9	36.09	24.0	0.0130	0	1	0.0

* blank spaces indicate no data collected

Table 7. Meter net tow data.

Station [+]	Tow Depth (m)	Net Area (m^2)	Tow Length (m)	Temp. (˚C)	Zoop. Biomass (ml)	Zoop. Density (ml/m^3)
008	500	3.140	7784	16.6	162	0.007
017	450	3.140	5713	17.8	46	0.003
027	677	0.785	4882	11.0	58	0.015
070	485	3.140	5982	14.7	16	0.00085
076	803	3.140	3643	7.6	59	0.005
076	50	0.785	1233	7.6	14	0.014
081	458	0.785	23674	13.2	33	0.002

[+] duplicate station numbers indicate simultaneously deployed nets

Table 8. Sediment sampling data.

Station	% 4000 (μm) *	% 3000 (μm) *	% 2000 (μm) *	%1000 (μm) *	%500 (μm) *	%250 (μm) *	%125 (μm) *	%63 (μm) *	% <63 (μm) *
030	0.6	3.0	0.3	0.5	74.0	8.2	10.9	2.5	0.0
031	20.0	2.6	5.3	2.6	14.7	8.0	18.7	6.7	21.3
032	13.0	5.0	11.5	24.0	39.6	3.5	1.5	0.1	1.8
035	0.4	0.5	1.2	3.7	7.4	4.0	17.1	27.5	38.2
037	0.5	0.0	0.1	0.1	0.8	0.5	3.0	8.0	87.0
038	0.5	0.2	1.1	1.1	4.0	3.05	5.0	5.0	80.05
039	0.0	0.0	0.2	0.0	0.3	0.0	1.0	0.4	98.1
040	0.0	0.0	1.0	1.0	0.6	2.0	2.5	3.0	89.9
041	0.0	0.0	0.0	0.5	0.2	0.4	2.0	1.2	95.7
042	0.0	0.0	0.5	0.5	2.4	0.8	3.2	5.5	81.6
043	0.3	0.0	0.0	0.1	0.4	0.5	1.4	0.9	96.4
044	0.0	0.0	0.1	0.1	0.2	0.4	11.3	0.3	87.7
045	0.0	0.0	0.5	0.5	0.5	0.5	0.5	1.0	96.5
047	0.0	0.0	0.0	0.1	0.1	0.1	0.8	1.6	97.3
048	0.0	0.0	0.0	0.0	0.1	0.1	0.4	1.0	98.4
049	5.0	0.0	0.1	0.1	0.1	0.5	1.0	1.0	97.5
050	0.0	0.0	3.8	0.7	0.4	0.4	0.4	1.5	92.7
051	0.0	0.0	0.0	1.0	2.0	1.0	4.0	7.0	85.0
052	0.0	0.0	0.0	0.0	0.0	0.5	0.5	1.0	98.0
053	2.06	0	1.03	0.206	0.309	0.206	0.206	0.412	95.6
054	62.5	5	8.75	7.5	5.5	2.5	1.25	1	6
055	0	0	0.0	0.2	0.2	0.2	0.2	1	98
059									

* blank spaces indicate no data collected

Scientific Results: Student Abstracts

Variability of Eighteen Degree Water in the Southern Sargasso Sea.

Donata Banyte and C'pher Gresham

Median temperature, depth and thickness of eighteen degree water (EDW) were investigated using temperature observations from CTD casts deployed by SEA cruises from 1992 to 2007. The spreading boundaries of EDW were investigated in the Southern Sargasso Sea. It was found that EDW may protrude further to the south through the passages between Bahamas. In addition, research provided evidence that eighteen degree water may form in large quantities even when winter NAO indecies are strongly positive.

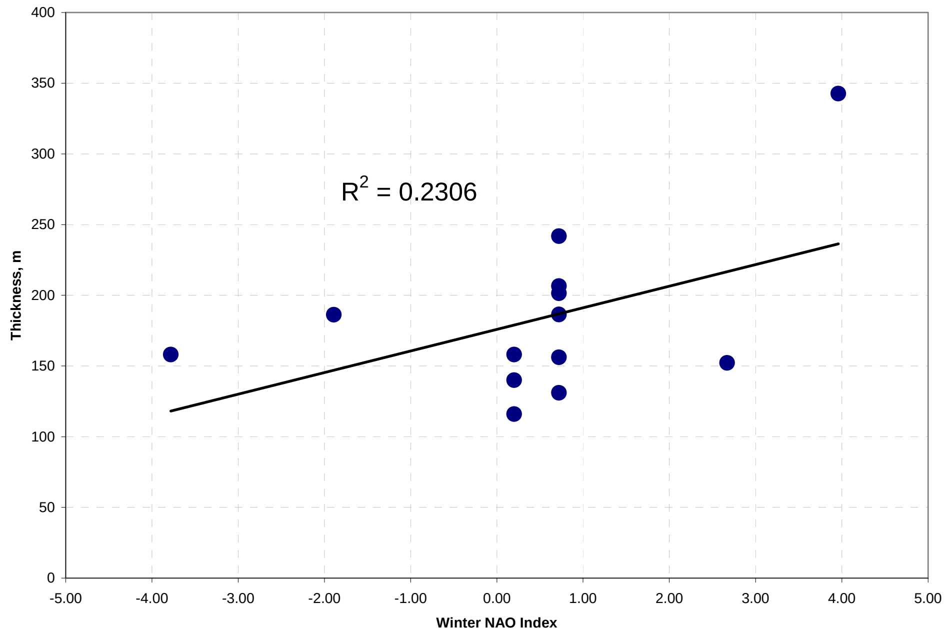

Figure 5. The strongest correlation between the NAO index and thickness of EDW achieved when the time lag was 4 years.

Vertical distribution of phytoplankton pigments from the Straights of Florida to the Sargasso Sea and the Caribbean Basin.

Emma Bishop

Phytoplankton pigments contribute significantly to the light attenuation properties of seawater and the depths at which specific pigments have been found varies in the water column. This is likely due to their various functions, either as photosynthetic (PS) pigments or photoprotective (PP) pigments. Additionally, the 1% light level has often been shown to be the location of maximum chlorophyll *a* concentrations (the major photosynthetic pigment). Spectrophotometric analysis was performed on filtered whole water from eight stations along the C-209 cruise track from the Florida Straits, through the Sargasso Sea and into the Caribbean Basin. Water was collected from 11-13 depths at each station and the 1% light level was calculated for all but two stations. The water was analyzed for eight phytoplanktonic pigments, four PS and four PP. The total absorbance by PS pigments and PP pigments was calculated separately and the PS:PP ratio was calculated. This ratio was plotted with depth to create a PS:PP depth profile for each station. The 1% light level did not vary significantly along the cruise track, though the depth of the maximum PS:PP did vary significantly.

Table 9. Depth of 1% light level and maximum PS:PP for each station.

Station	**1% light level**	**Corrected 1% light level**	**Depth of max PS:PP**
C209-003	94	94	99
C209-009	94	94	41
C209-016	64	92.8	65
C209-028	94	94	78.1
C209-068	91	91	78
C209-078	91	91	100
Standard Deviation	11.85	1.47	22.16
Coefficient of variation	13.46	1.58	28.83

The relationship between inorganic nutrients and phytoplankton growth in the South Sargasso and North Caribbean Seas along the cruise track of the *S.S.V Corwith Cramer*.

T. Joseph Brown

This study is an examination into the relationship between the inorganic nutrients in the water column and phytoplankton growth. Nutrient concentration is an important factor in determining the growth rate of phytoplankton. Nitrates, phosphates, silicates, and iron are the nutrients that have the greatest effect on this relationship. For this study six hydrocast were taken in the South Sargasso Sea and North Caribbean Sea. These samples were analyzed for nutrients and chl-a values. The nutrient values were compared to chl-a values to determine if there was a correlation between the two variables. The results suggested a stronger correlation between phosphate and silicate values and chl-a than nitrate values. This suggests that at the time of the study in the South Sargasso Sea and North Caribbean, phosphates and silicates were more significant factors in determining phytoplankton growth than nitrates.

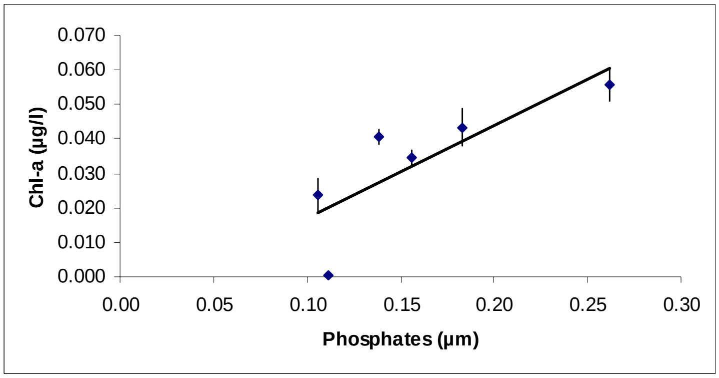

Figure 6. Shows the mean phosphate value of each station plotted against the mean chl-a value of each station. P value 0.051

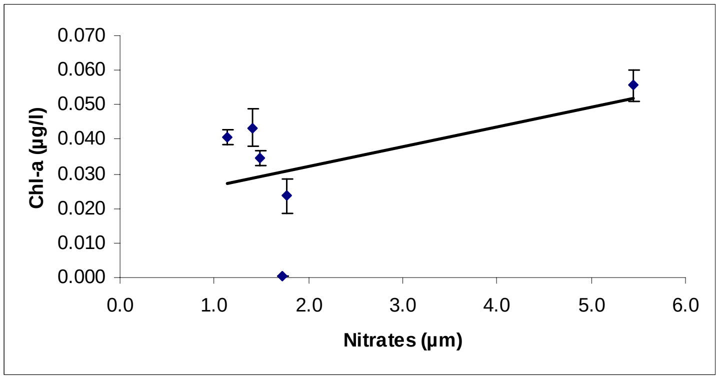

Figure 7. Shows the mean nitrate value of each station plotted against the mean chl-a value of each station P value 0.331

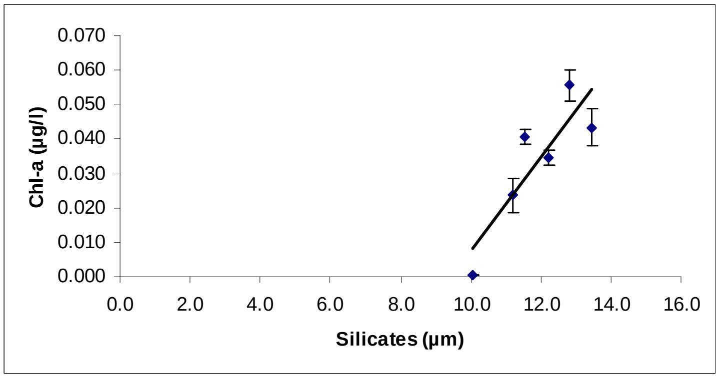

Figure 8. Shows the mean silicate value of each station plotted against the mean chl-a value of each station. P value 0.024

An observational analysis of freshwater flow from the Yuna and Barracote Rivers and its impact on current, salinity and temperature of Samana Bay's estuarine environment.

Nicholas Cavanaugh

Two major rivers, the Yuna River and the Barracote River, feed Samana Bay, serving as the largest semi-enclosed estuarine bay in the Caribbean. Warm, fresh water flowing from these rivers into the bay interacts with colder, higher salinity waters being forced into the bay by the Antilles current. This causes steep salinity and temperature gradients, as well as forces high resonance times and degrees of circulation within the bay. It was hypothesized that density and bathymetric driven currents would form as a result water mass interaction in the uniquely shallow bay, forming two gyres. Aboard the SSV Corwith Cramer during 24-25th of February, ADCP and flow through surface temperature and salinity data were collected within the Samana, as well as near the mouths of the Yuna and Barracote Rivers. The data displayed strong evidence in support of an Antilles forced gyre at the mouth of the bay, indicating gradual temperature and salinity gradients as well as currents characteristic of a the northern edge of a gyre. Current data collected at the head of the bay supports the hypothesis of an estuarine gyre, however without more comprehensive data, certainty is limited.

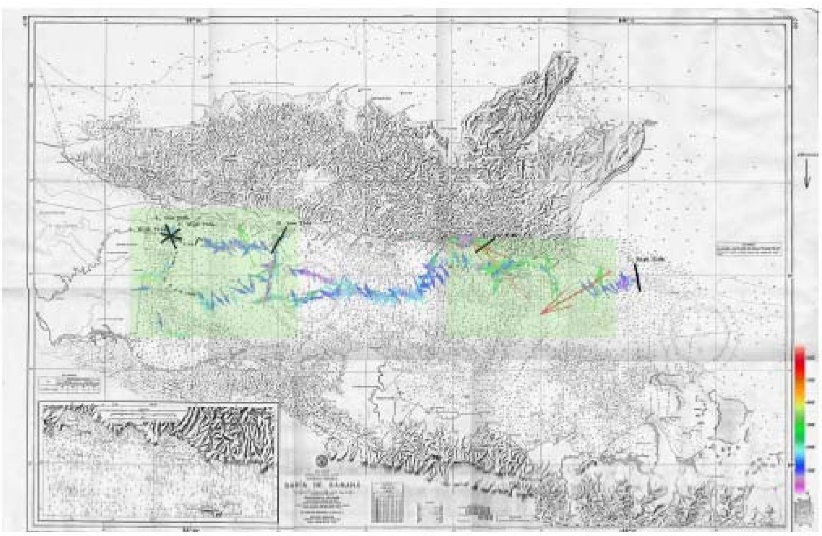

Figure 9. ADCP bin 1 (12-22 m) data collected 24-25th February 2007 in Samana Bay, DR. Current: magnitude and direction.

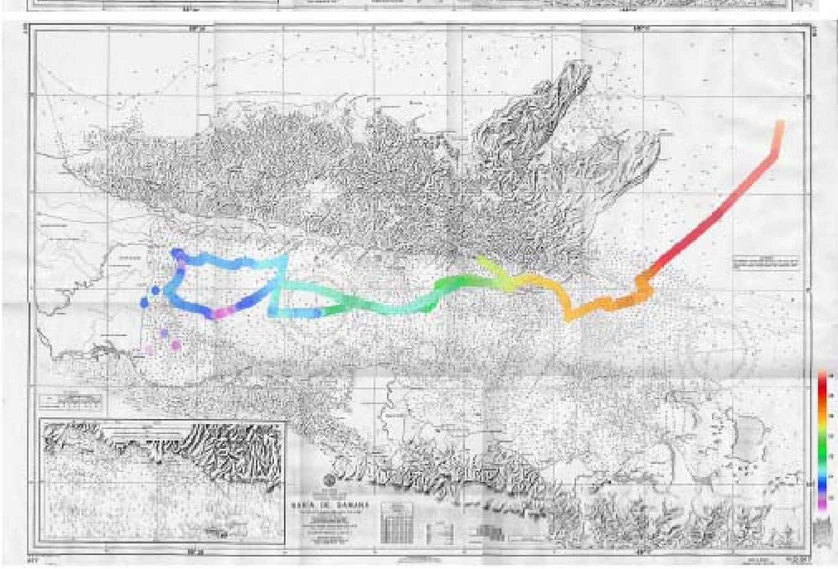

Figure 10. Flow-through salinity (PSU) data collected 24-25th February 2007 in Samana Bay, DR.

Impacts of microzooplankton grazing on phytoplankton population growth: off the coast of Key West, Florida, Samana, Dominican Republic and in the Sargasso Sea.

Maya Choy-Sutton

Microzooplankton grazers play an important role in the transfer of biomass to higher trophic levels. The purpose of this study was to determine whether grazing rates were correlated to distance from land, and whether grazing rates were higher for smaller phytoplankton (<10 µm) than for larger phytoplankton (<200 µm). A total of four dilution experiments were conducted in four different locations: the Gulf Stream/Florida Straights, S. Sargasso Sea, Samana Bay, Dominican Republic and North of Navassa Island. The data from these four stations showed that grazing rates increased with proximity to land. Overall, grazing rates for phytoplankton smaller than 10 µm were up to 57% higher than those for all phytoplankton smaller than 200 µm at stations closer to shore. At stations farther from land microzooplankton grazing rates for phytoplankton smaller than 200 µm were higher than those for phytoplankton smaller than 10 µm by 20%-38%.

Table 10. Grazing rates and intrinsic growth rates for both phytoplankton <200 µm and phytoplankton <10 µm. Grazing rates here were the absolute value of the slopes created with the linear regressions in figures 2-5.

	<200 µm		**<10 µm**	
	Grazing Rate d^{-1}	Intrinsic Growth Rate d^{-1}	Grazing Rate d^{-1}	Intrinsic Growth Rate d^{-1}
Station 1: Gulf Stream/Florida Straights	0.337	1.64	0.2089	0.75
Station 2: S. Sargasso Sea	0.9706	0.71	0.772	0.56
Station 3: Samana Bay	2.5831	2.64	3.6592	3.72
Station 4: N. of Navassa Islnd.	1.0788	-1.36	2.499	0.75

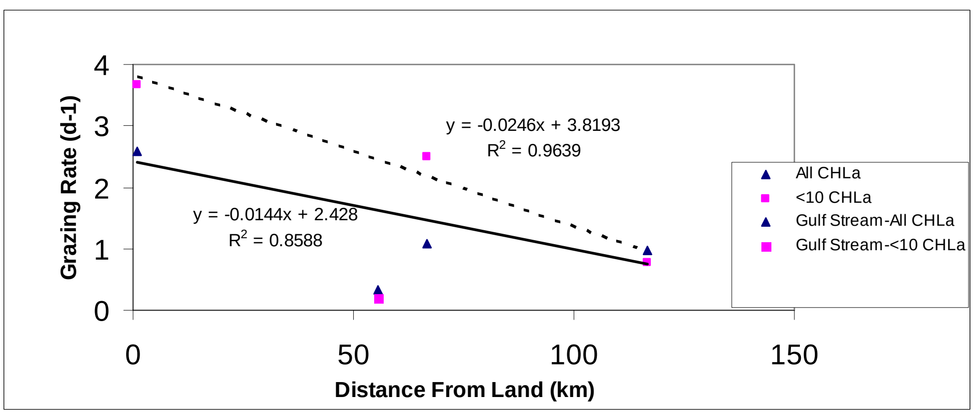

Figure 11. The points closest to land (0.926 km) represented Station 3. The points 55.56 km from land represented Station 1, and the points farthest from land (116.676 km) represented Station 2. For both Stations 1 and 2 the grazing rates for all phytoplankton less than 200µm were greater than those on phytoplankton less than 10µm. For Station 3 the grazing rate for all phytoplankton less than 200 µm was less than 10 µm. Overall, grazing rates were highest for Station 3, second highest for Station 2 and lowest for Station 1. For Station 4, (66.672 km from land) the grazing rates for all phytoplankton less than 200 µm were less than for phytoplankton less than 10 µm. For the linear regressions, Station 1 was not taken into account.

Grain size and sediment composition in Samana Bay, Dominican Republic.

Kara Culgin and Kelsey Nickles

We conducted a study of grain size and sediment composition in Samana Bay, Dominican Republic. We hypothesized that there would be a composition and grain size gradient within the bay. We expected the amount of carbonates to increase and the grain size to decrease with increasing distance from the head of the estuary. We further hypothesized that both the amount of carbonates and the grain sizes found would be greater outside than inside of Samana Bay. We collected 22 sediment samples along the east-west transect using the Shipek Sediment Grab and the Fisher Sediment Scoop. We analyzed each sample for composition using a reflectance spectrometer and for grain size using a series of sediment sieves.
The results of our composition analysis support our hypothesis; showing that the amount of carbonate in each sample increase with decreasing longitude. However our analysis of grain size nullifies that aspect of our original hypothesis. In the bay grain size decreases with increasing longitude. Our comparative analysis between two samples support both of our original hypotheses in that the amount of carbonate is greater and grain size is larger outside of the bay.

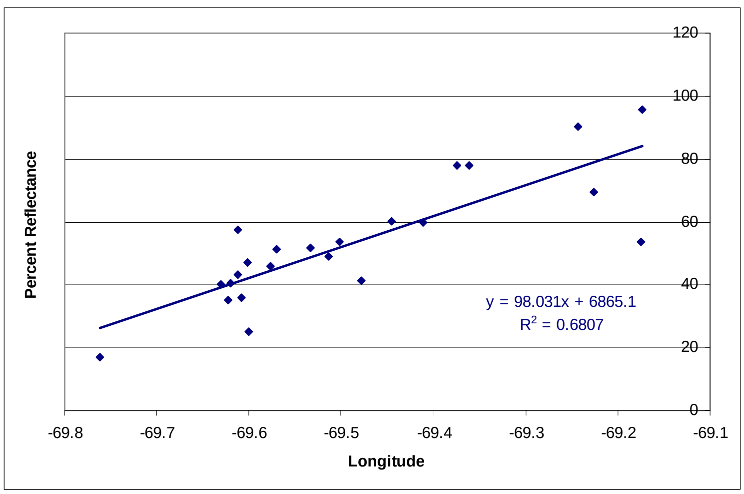

Figure 12. Percent Reflectance versus longitude. This figure illustrates that higher amounts of carbonates are found at lower longitudes, further away from the head of the bay. There is a strong linear trend between percent reflectance and longitude (P value <0.05).

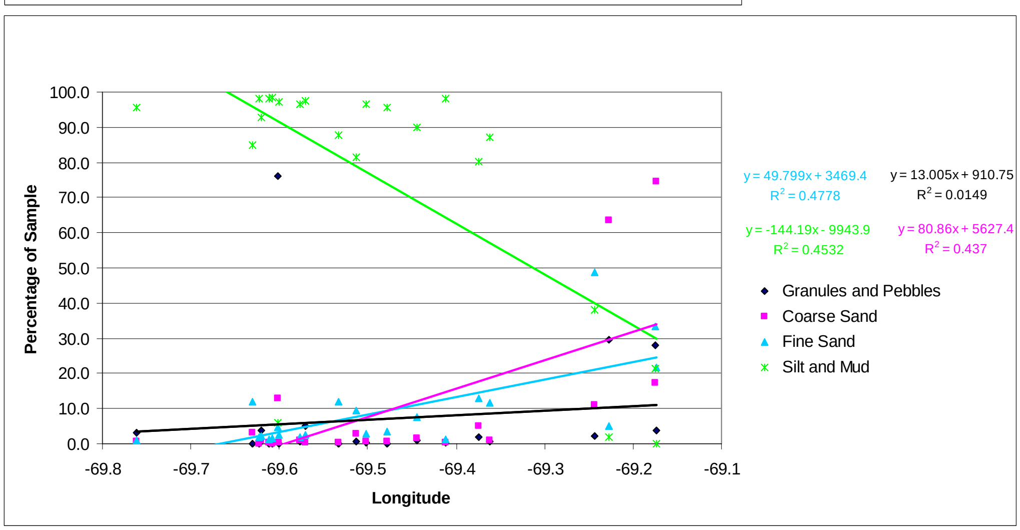

Figure 13. The four categories of grain size plotted against longitude. Silts and muds, fine and course sands all followed a significant linear trend; however the relationship for granules and pebbles did not prove to be significant.

The distribution and concentration of pelagic and coastal pollutants in the Caribbean as they relate to currents and shipping lanes.

Colleen Detjens, Jacqueline Perlow and Amanda Rook

Macroplastic, microplastic, and tar debris pose a serious threat to marine and coastal ecosystems. To expand the large body of SEA research regarding marine pollution, this study considers how proximity to shipping lanes and to areas of converging and eddying currents affect debris concentrations. It also compares coastal debris to pelagic debris. It was hypothesized that macroplastics would be of greater relative abundance in areas near major shipping lanes, as large amounts of new debris is discarded from commercial vessels. In addition, it was surmised that microplastics and tar would make up a greater proportion of total marine debris in areas where currents either converge or eddy, as currents carry and suspend a large amount of aged marine debris. Finally, it was assumed that coastal concentrations of all types of debris would be higher than pelagic concentrations due to the steady accumulation of pollution on beaches.
To investigate macroplastic and tar distribution, neuston nets were deployed twice daily along the C-209 cruise track. For microplastics, surface samples were drawn and filtered twice daily. In addition, macroplastic transects were sampled at three beaches and microplastics were filtered from sediment samples of these beaches. Data gathered suggests that Samana Bay and the Windward Passage had the highest relative abundance of macroplastics, while the Southern Sargasso and North Bahamas had the highest relative abundance of microplastics. In coastal areas, concentrations of macro and microplastics were higher than in the surrounding waters. No tar was found in any sampling. These results support using proximity to shipping lanes and eddying or converging currents as an indicator for macro and microplastic distribution and concentration, but are statistically insignificant.

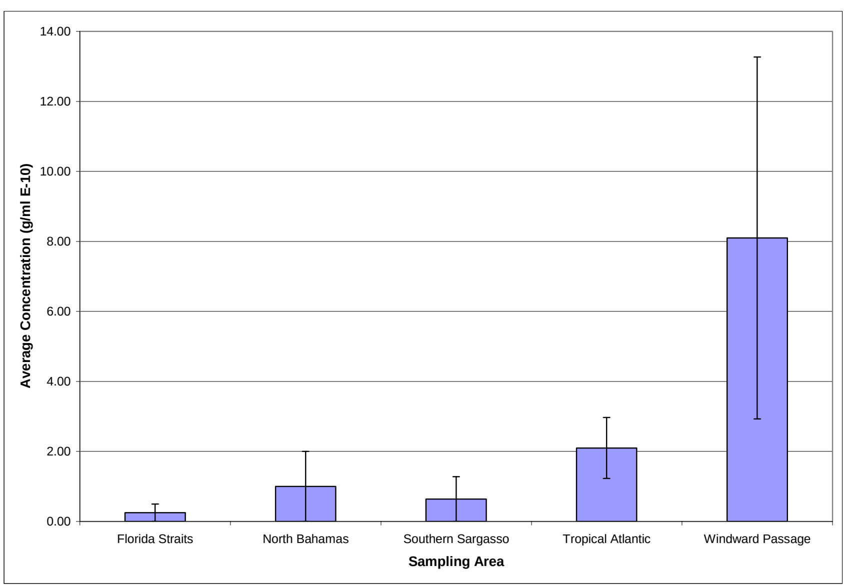

Figure 14. Average concentration of macroplastic by area, excluding Samana Bay. Error bars show standard error.

The distribution and health of Myctophid fish in sub-tropical and tropical faunal regions along the C-209 cruise track.

Abigail Dominy

Myctophid fish were captured and analyzed along the C-209 cruise track to determine health and distribution in relation to water masses. Myctophids are characterized by distinctive photophore patterns on their ventral and lateral sides. These bioluminescent photophores are thought to function in survival against predators. Of the twenty five specimens that were caught, eighteen were speciated using the Nafpaktitis (1977) and Smith (1977) dichotomous keys. This resulted in eleven species, all of which were weighed and measured to determine a general standard weight curve and the Fulton Condition Index. It is unclear why there was an unusually small sample size; however the findings of this research lend some support and confirmation to previously observed distribution patterns. The species *Loweina rara* was found outside of its previously observed range and it is speculated that some migration took place. No distinct trend in distribution in relation to water masses could be determined.

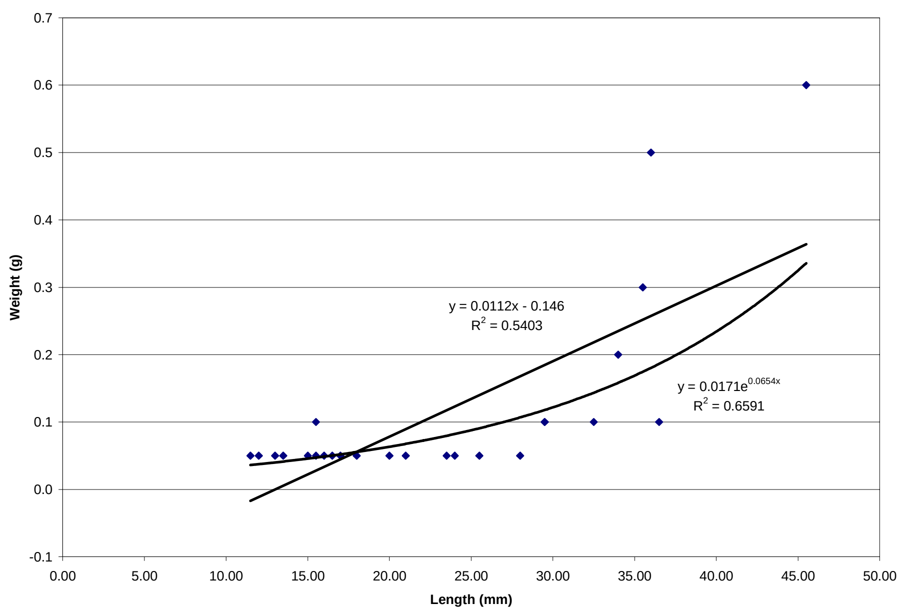

Figure 15. Standard weight curve.

The deep Sound Fixing and Ranging Channel.

Sarah Jackson and Melissa White

The objective of this research was to determine the depth (position in the water column) of the SOFAR channel within the water column along S.S.V. Corwith Cramer cruise track 209. A sound velocity profile for cruise track C-209 was created using data recorded by a Seabird CTD (Conductivity, Temperature, Depth). The temperature, salinity and pressure data derived from the CTD deployments then allowed for the calculation of underwater sound velocity using the Chen-Millero equation. Sound velocity profiles were compared in order to see the variations in the location of the SOFAR channel axis across the various regions that were traveled through on cruise track C-209. The depth of the minimum sound velocity was then defined, thus indicating the axis of the SOFAR channel. This information was finally compared to the thermal structure of the cruise track, more specifically the thermocline in order to determine whether or not a correlation existed.

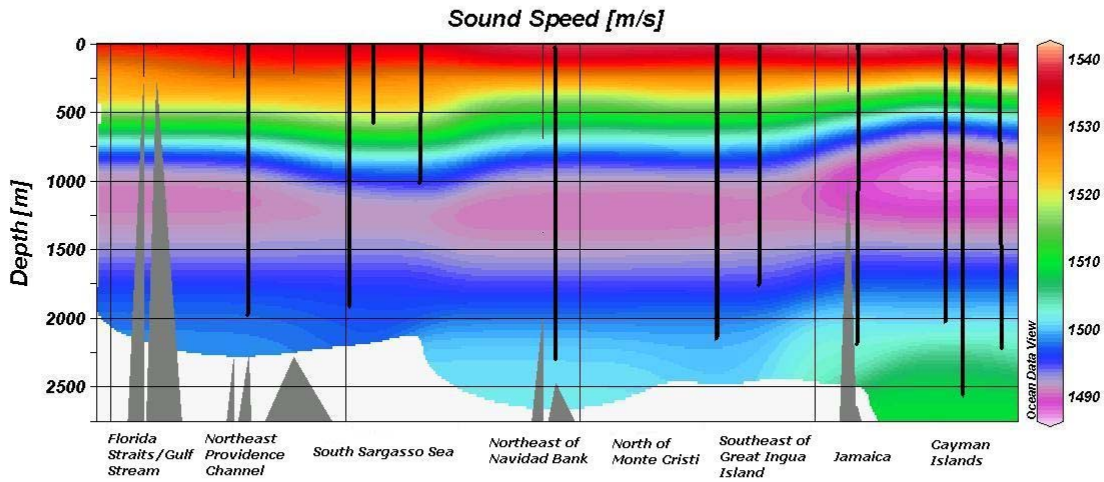

Figure 16. Sound Velocity profile along cruise track C 209. Shows that the channel axis move down in the water column in the Sargasso Sea and up in the water column in the Caribbean.

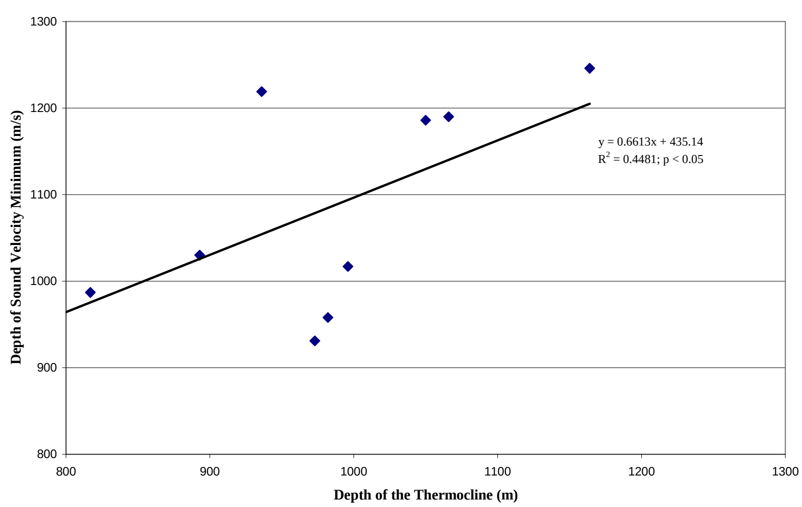

Figure 17. Shows the correlation between the depth of the thermocline and the depth of the channel axis. Regression analysis proves a direct correlation.

Quantification of intraspecific morphological variability in Chaetognatha of the Caribbean region.

Christopher Laumer

Despite their abundance and ecological importance, chaetognaths remain among the most unstudied components of the marine planktonic realm. Particularly poorly understood is the question of intraspecific variability, which is remarkable given the noted environmental sensitivity of most chaetognath species. For this study, I used geometric morphometrics to observe and test for differences in the range and nature of intraspecific morphological variability in two unrelated species, *Sagitta enflata* and *Krohnitta pacifica,* from Silver Bank and Navidad Bank (Dominican Republic). In both qualitative and quantitative analysis of landmark data taken from the microphotograph images of the caudal segment, I find no evidence for a difference in the range of intraspecific variation between these two species. Additionally, these landmark data demonstrate that the most dominant component of total intraspecific variation occurs along the anterior-posterior axis. Such a study has never been undertaken before; it is my hope that these results may demonstrate the feasibility and value of quantitative investigations of chaetognath morphology.

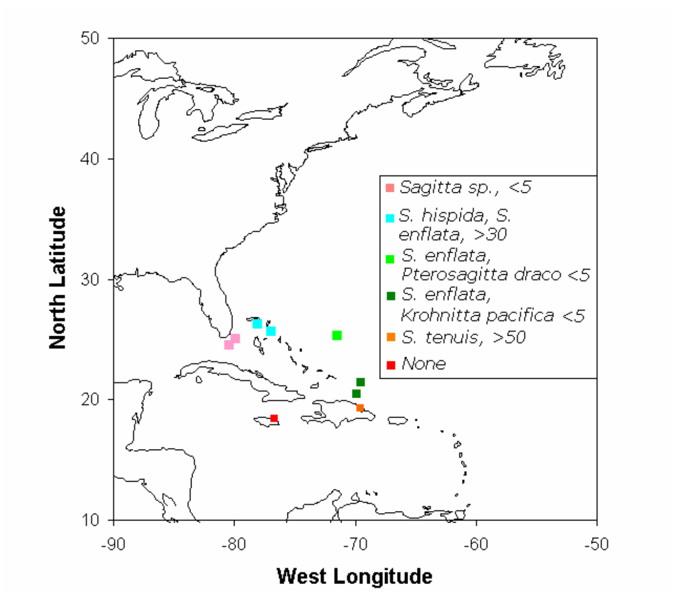

Figure 18. Charted locations of neuston tows examined for chaetognaths along the C-209 cruise track. Numbers given refer to rough estimates of chaetognath density per neuston tow (mean tow area for stations sampled: 646 m^2). Species identifications after Michel 1984.

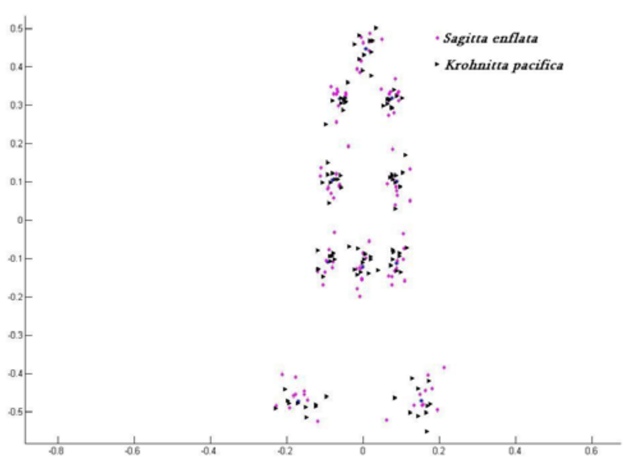

Figure 19. Procrustes alignment of digitized chaetognath specimens. The geometric center of each landmark is shown in blue. Axes and orientation are arbitrary. Posterior faces the top of page.

Chlorophyll *a* distribution and its limiting factors.

Victoria Leavitt and Ryan Mahoney

Water quality parameters (temperature, salinity, nitrate, phosphate, and chlorophyll *a*) were measured over a five week long period aboard the SSV Corwith Cramer. The cruise track (C209) encompassed areas between Key West, Florida and Port Antonio, Jamaica. Temperature, salinity, nitrate, and phosphate concentrations were analyzed for evidence of significant correlations between chlorophyll *a* and these parameters. Along the cruise track surface samples were taken via bucket. Open ocean stations were compared to inland stations in Samana Bay, Dominican Republic. As expected, higher levels of chlorophyll *a* were observed in Samana Bay compared to open ocean stations. In Samana Bay highest levels of chlorophyll *a* occurred simultaneously with high temperature and low salinity levels. Nutrients in the bay were found to have no significant effect on chlorophyll *a*. Open ocean stations yielded high levels of chlorophyll *a* with decreasing temperature and high nitrate concentrations. Phosphate concentrations and salinity showed no significant correlation with chlorophyll *a* levels in open ocean stations.

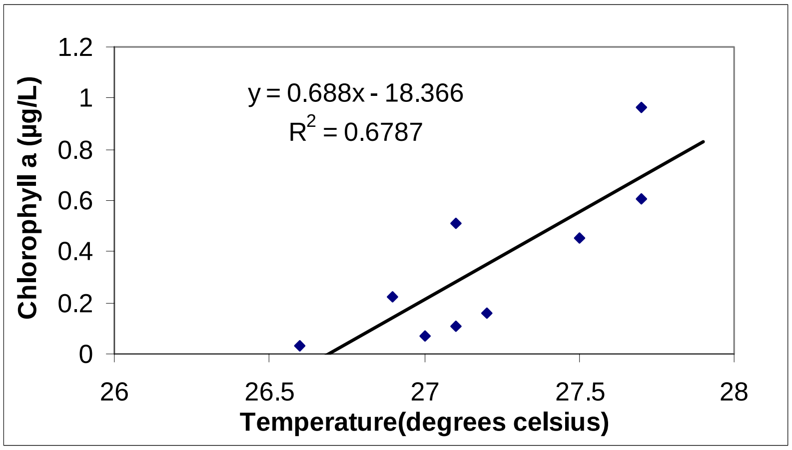

Figure 20. Chlorophyll a as a function of temperature in Samana Bay. X axis is temperature (degrees Celsius). Y axis is chlorophyll a (µg/L). Temperature ranges from 26.6-27.7degrees and chlorophyll a ranged from .034-.966 µg/L. There was a significant positive relationship between chlorophyll a and temperature ($p<0.05$).

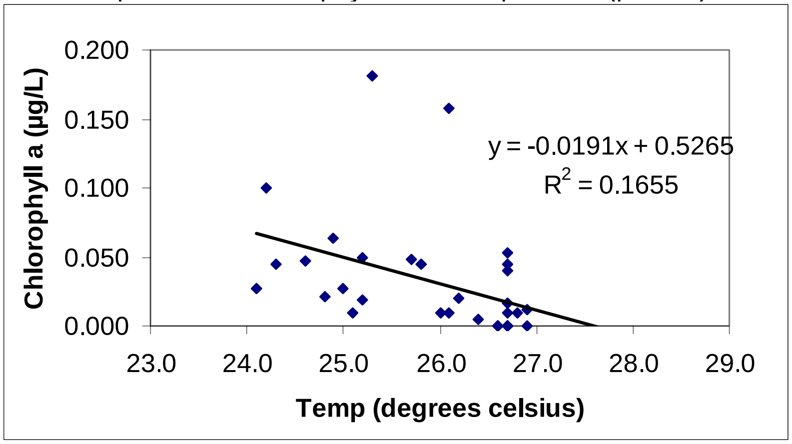

Figure 21. Chlorophyll a as a function of temperature for oceanic stations. X axis is temperature (degrees Celsius). Y axis is chlorophyll a (µg/L). Temperature ranged from 24.1 to 26.9 degrees, and chlorophyll a ranged from o to .181 µg/L. There was a significant negative relationship between chlorophyll a and temperature ($p<0.05$).

Effect of water temperature and salinity on antennule length of Calanoid copepods.

Daniel Mancilla Cortez

Neuston net tows were used to collect copepods from the surface along the C209 cruise track from Key West to Key West. A total of 154 individuals were sampled from a total of 19 tows. Two measurements were taken for each individual: the length from the most anterior tip of the cephalothorax to the bottom of the urosome and to the tip of the antennule. The hypothesis being tested is that copepods found in denser water should have relatively shorter antennules, as their buoyancy will be relatively high and vice versa.
A linear regression conducted between measurements of body length and antennule length showed a significant correlation in which antennule length increased with body length. A comparison between relative antennule length and body length showed a significant trend where relative antennule length decreases as body length increases. Relative antennule length was shown to increase with salinity, and decrease as temperature increased in male samples. Contrary to the initial hypothesis, the trend observed between antennule length and salinity and antennule length and temperature on male copepods indicates that denser water yields longer antennules. This suggests that it is more advantageous to have larger antennules in denser water, because a larger surface area is required to move through a denser medium.

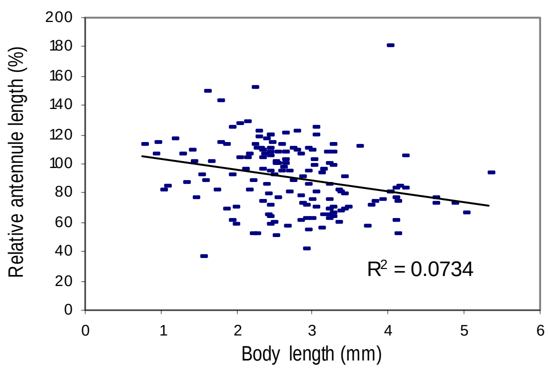

Figure 22. Plot of body length against antennule length, p = 0.00. x values in millimeters, y values are percentages.

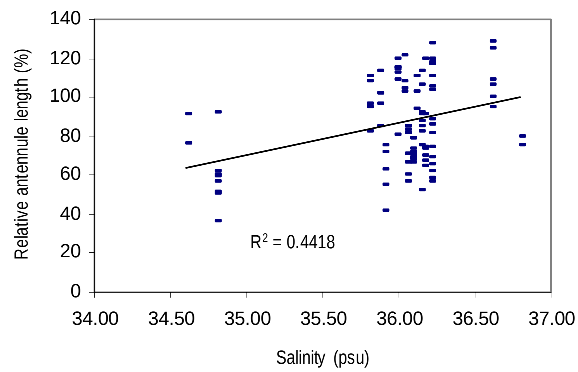

Figure 23. Plot of tow station salinity against relative antennule length. p = 0.00. x values in psu, y values are percentages.

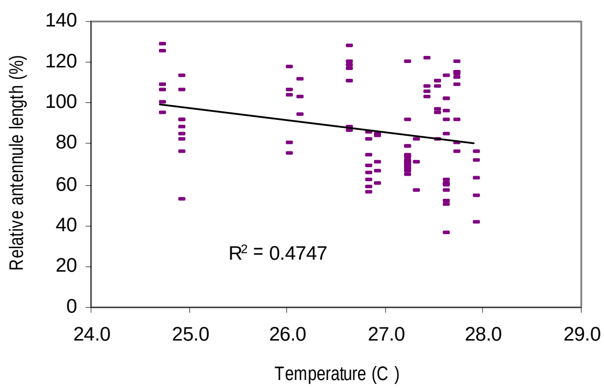

Figure 24. Plot of tow station temperature against relative antennule length. p = 0.00. x values in degrees C, y values are percentages.

The variation of mesopelagic biomass and biodiversity along the 209 cruise track of the *S.S.V. Corwith Cramer.*

Anna Studwell and Michael Tillotson

The mesopelagic zone, located at depths between 200 and 1000 meters, is a vast, nearly lightless expanse known for an extremely low abundance of life. The goals of this study were to correlate the planktonic density of the mesopelagic zone in the Sargasso and Caribbean Seas to that of the planktonic density at the sea surface between February 13 and March 22, 2007, and secondly, to determine both planktonic and nektonic (>2cm) composition and distribution. A 2-meter mid water trawl (1000 µm mesh) was deployed to mesopelagic depths simultaneously with a neuston net at the surface at five different locations along the C-209 cruise track. Results indicated no significant correlation between mesopelagic and surface biomass. A linear connection may still be plausible provided that other variables such as moon phase and inconsistent sampling depth are taken into account. A Shannon-Weiner index indicated that surface sample zooplankton diversity varied by location, whereas mesopelagic zooplankton diversity changed little between stations. Mesopelagic nektonic diversity varied considerably and the nektonic faunal assemblage of the Caribbean Sea differed greatly from other locations having a very large quantity of mesopelagic fish.

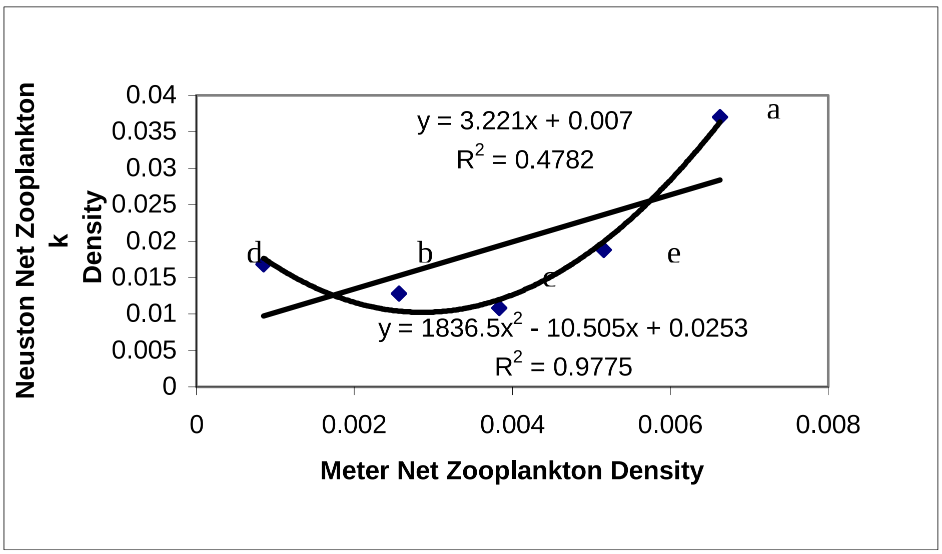

Figure 25. A comparison of zooplankton densities from simultaneously conducted neuston net and 2-meter net tows at selected locations along the 209th cruise of the *S.S.V. Corwith Cramer*, Feb-March 2007. a: NW Providence Channel, b: Sargasso Sea, c: North of Silver Bank, d: Silver Bank Passage, e: North of Navassa (Linear, p= 0.19).