

CRUISE REPORT

C251

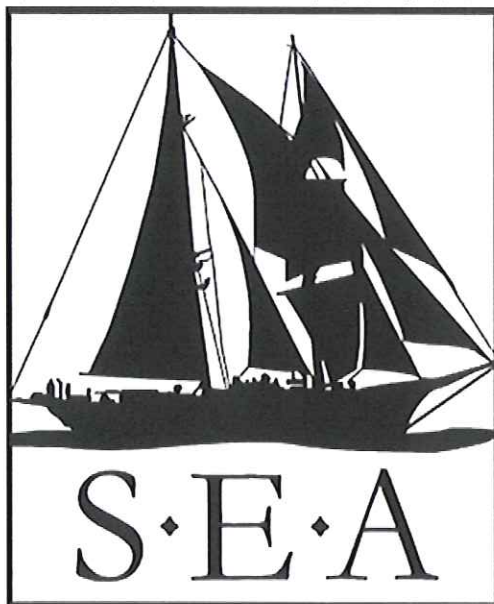
SCIENTIFIC ACTIVITIES

San Juan, Puerto Rico- Antigua- Union Island- Tobago Cays- Bequia- Montserrat- St. Croix, USVI

February 14-March 24, 2014

SSV Corwith Cramer

SEA Semester®



Sea Education Association
Woods Hole, Massachusetts

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This document should be cited as:

Lea, Charles E., 2013. Final report for S.E.A. cruise C251. Sea Education Association, Woods Hole, MA 02543.
www.sea.edu.

To obtain unpublished data, contact the Chief Scientist or SEA data archivist:

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Data Description

This cruise report provides a record of data collected aboard the SSV *Corwith Cramer* during Cruise C251 (U.S. State Department Cruise 2013-090). The cruise track of C251 (Figure 1, Table 1) was a passage from San Juan, Puerto Rico to St. Croix USVI with stops at Antigua, the Grenadines and Montserrat. Aspects of the southwestern North Atlantic and eastern Caribbean were recorded on C251 including currents, temperature, salinity, chlorophyll, these are displayed in Figures 2-9. The cruise participants are listed in Table 2. Student projects aboard C251 are listed in Table 3.

During the six week voyage we collected samples or data at 50 discrete oceanographic stations (Appendix A), and 43 surface stations (Appendix B). Chemical properties of seawater with depth are contained in Appendix C. The CTD information is listed in Appendix D and the profiles are illustrated in Appendix E. Lists of biological net samples are contained in Appendix F and summaries of sediment collections are listed in Appendix G.

Figure 1. Midnight and noon positions on SSV *Corwith Cramer* cruise 251.

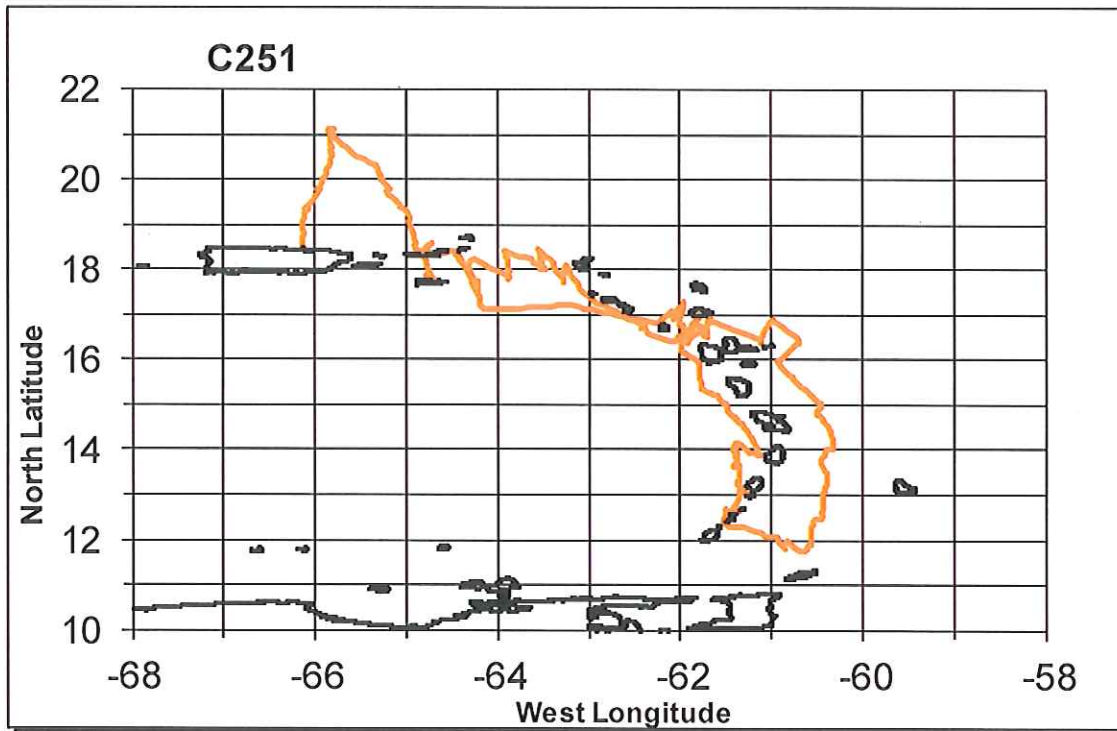


Figure 2. CTD Temperature Cross Section on C251

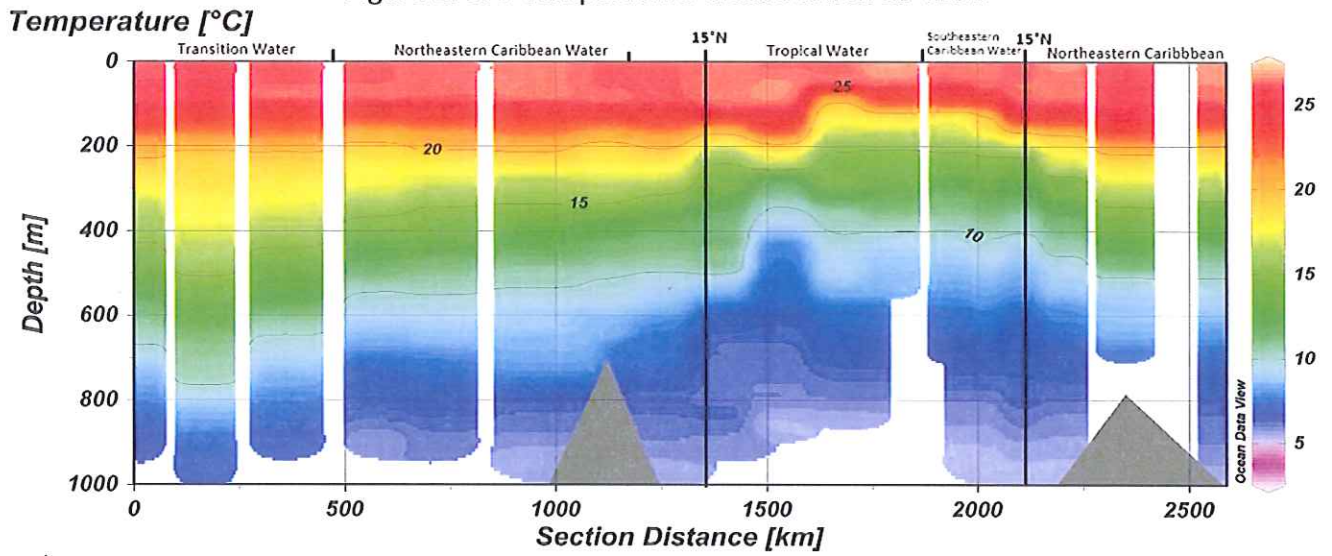


Figure 3. CTD Salinity Cross Section on C251

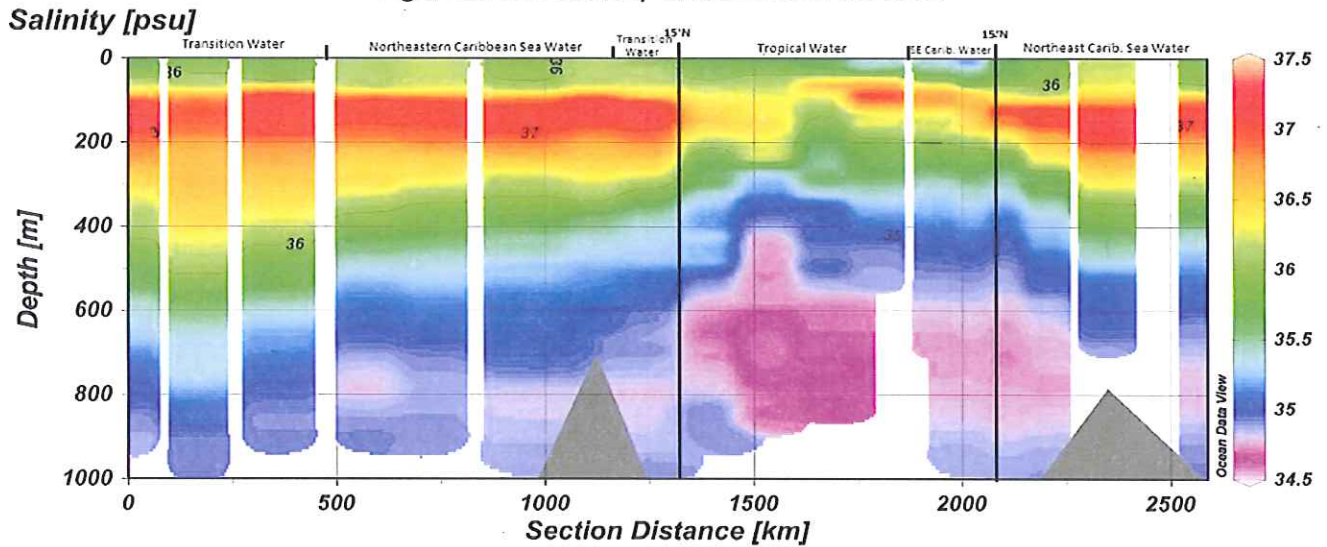


Figure 4. Density along the C251 Cruise Track

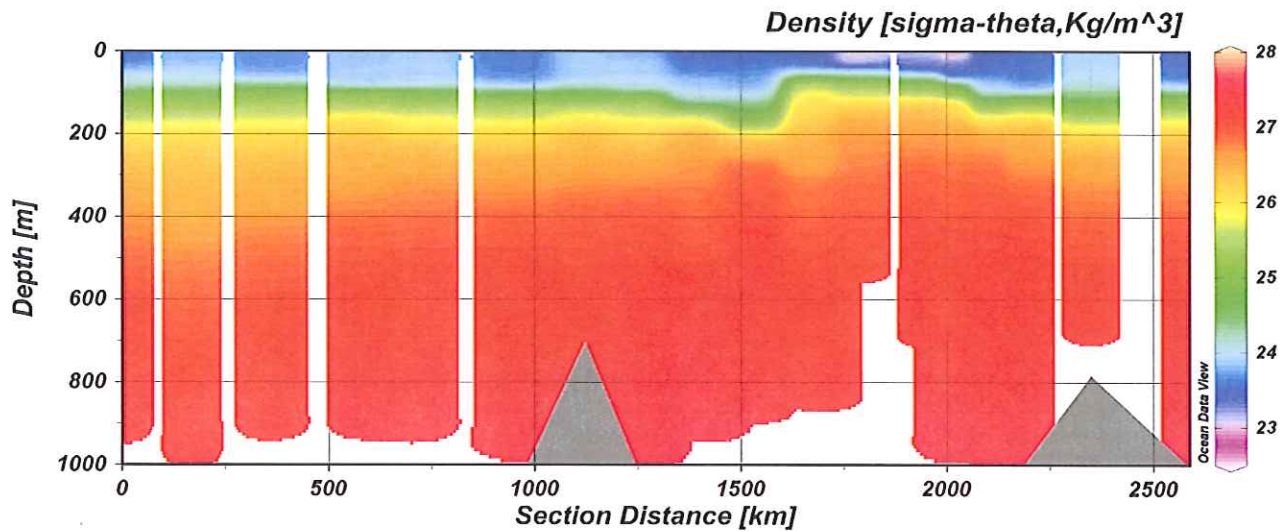


Figure 5. Cross Section of *In situ* Dissolved Oxygen on C251

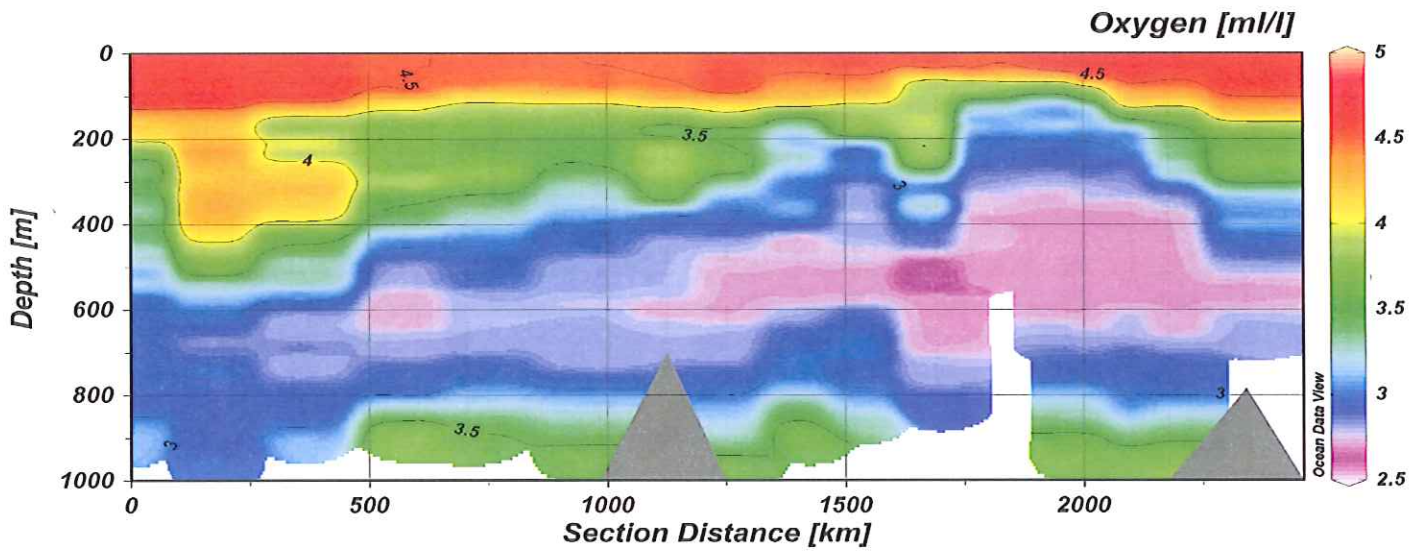


Figure 6. Cross Section of Percent Saturation of Dissolved Oxygen on C251

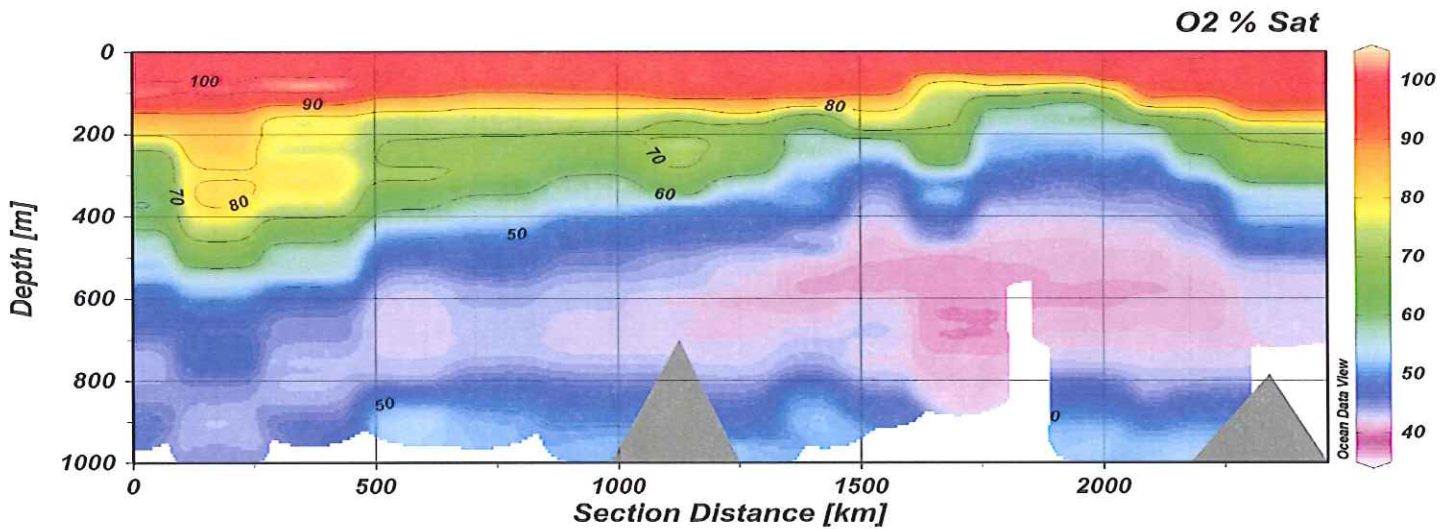


Figure 7. Cross Section of *in situ* Chlorophyll Fluorometer measurement on C251

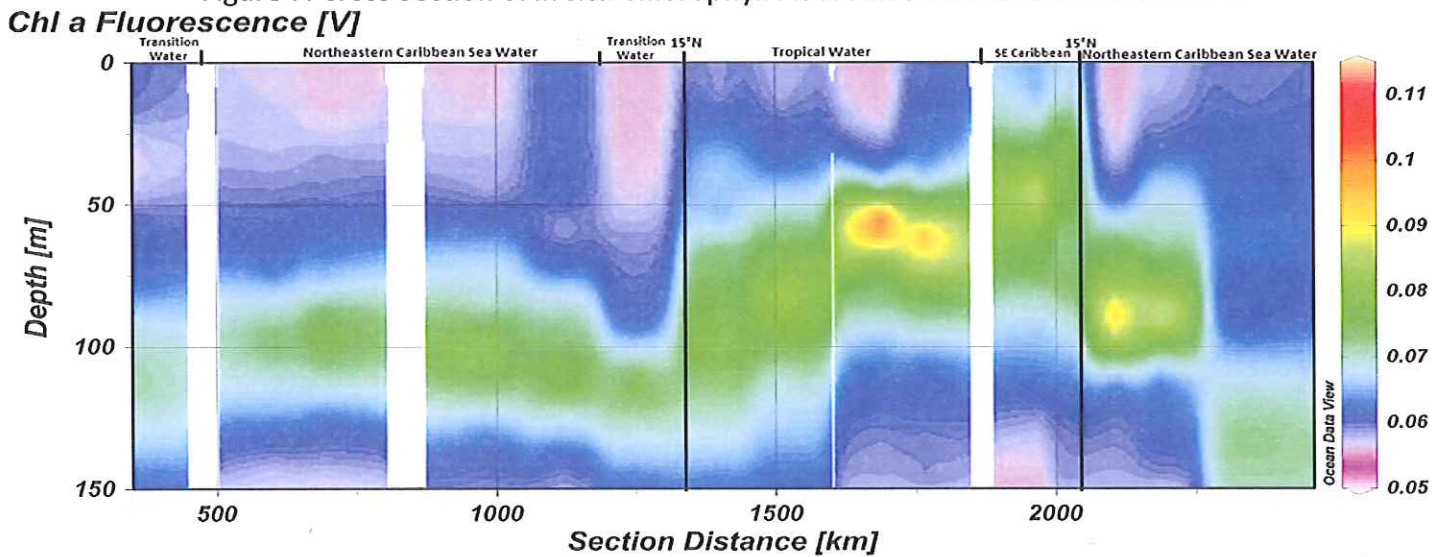
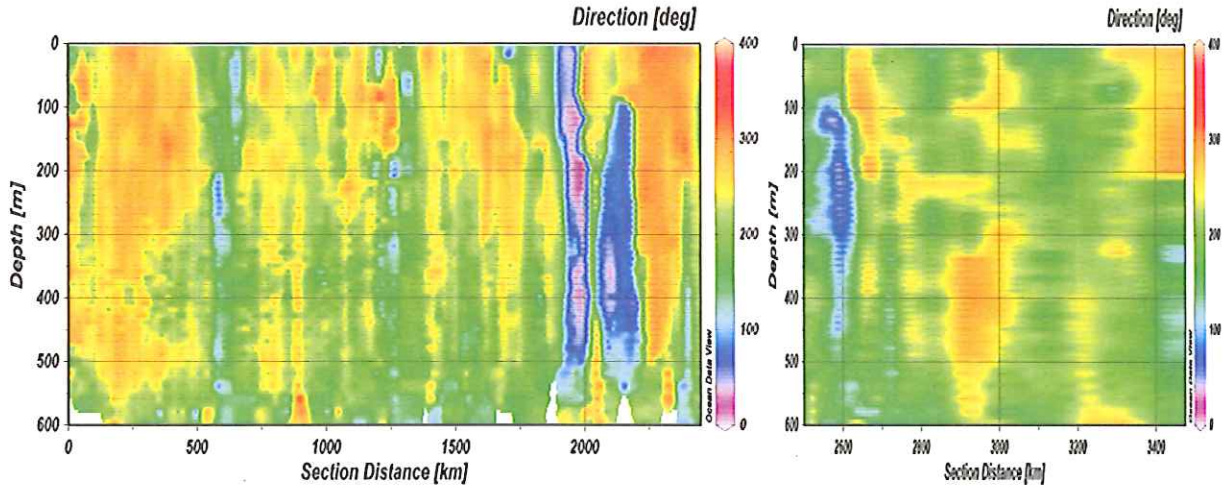


Figure 8. ADCP derived direction and magnitude of the current on cruise C251.
 8a. Direction of current on C251 San Juan to Bequia (left) Bequia to St. Croix (right).



8b. Magnitude of current on C251 San Juan to Bequia (left) Bequia to St. Croix (right).

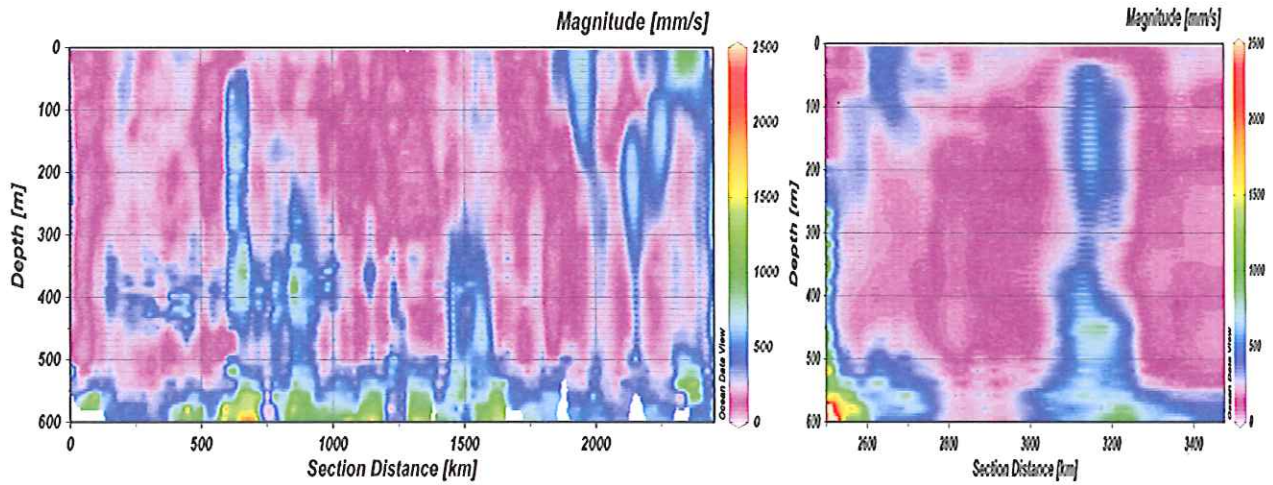


Figure 8c. Magnitude and direction of the surface current on C251

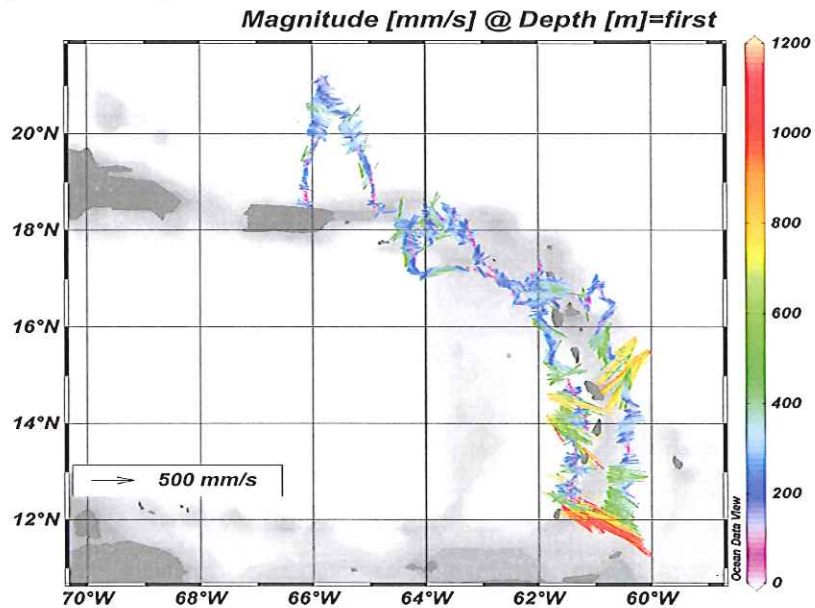


Figure 9. C251 Surface measurements: Temperature, Salinity and Chlorophyll Fluorescence.

Figure 9a. Surface Temperature.

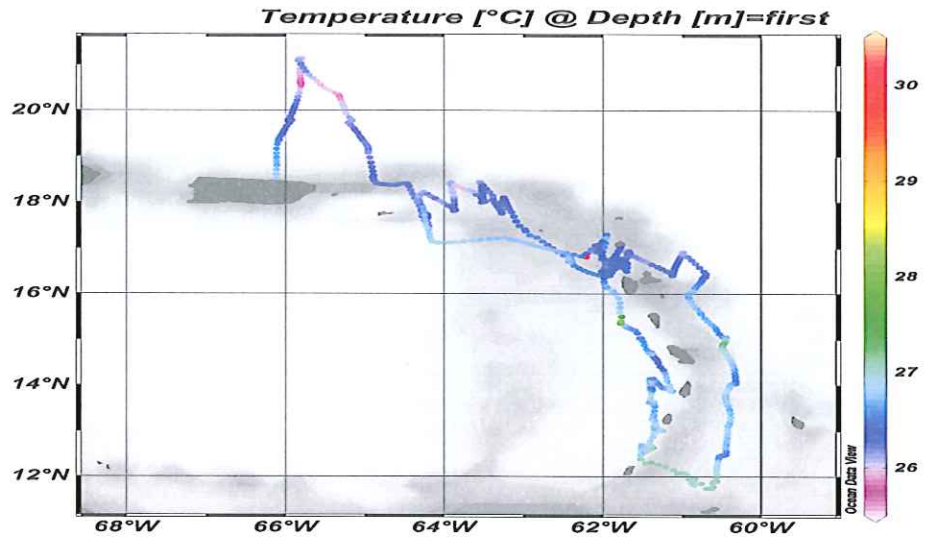


Figure 9a. Surface Salinity.

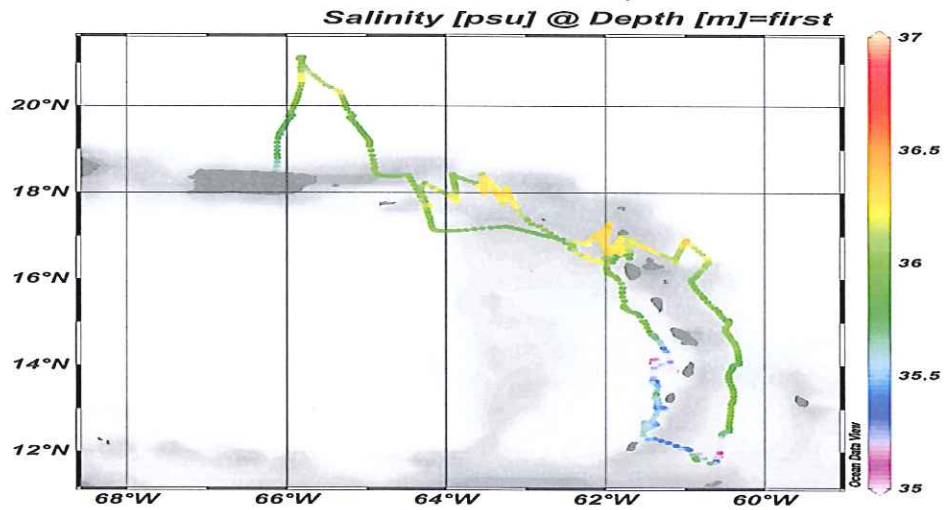
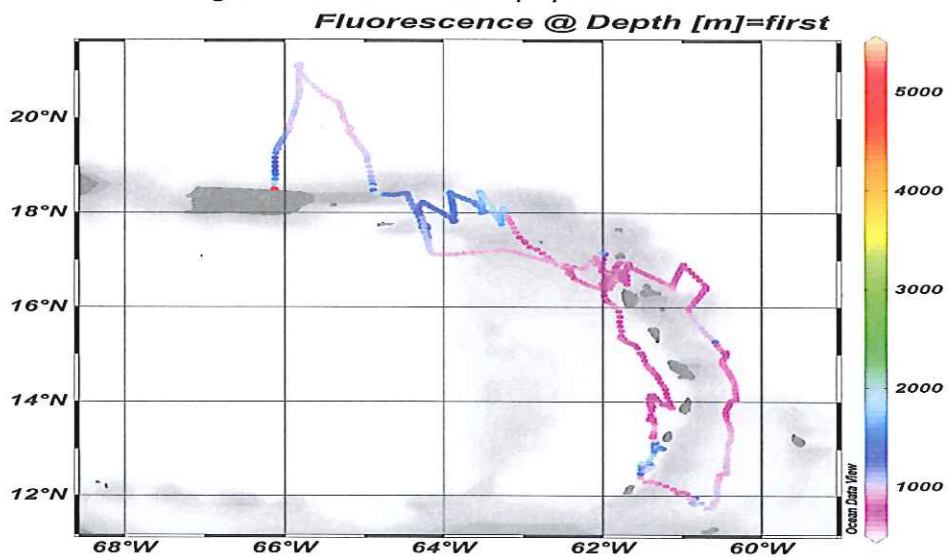


Figure 9a. Surface Chlorophyll fluorescence.



TABLE

1.

C251 Midnight and Noon
Positions

DATE	TIME	LAT.	LONG.	COMMENTS
2014	(local)			
14-Feb	1200	18°27.8' N	66°6.7' W	Alongside, San Juan, Puerto Rico
15-Feb	0000	18°27.8' N	66°6.7' W	Alongside, San Juan, Puerto Rico
	1200	18°27.2' N	66°6.3' W	Anchored, San Juan Puerto Rico
16-Feb	0000	19°20.7' N	66°4.7' W	
	1200	19°46.1' N	65°58.6' W	
17-Feb	0000	20°35.7' N	65°48.6' W	
	1200	21°7.5' N	65°50.5' W	
18-Feb	0000	20°20.1' N	65°19.7' W	
	1200	19°43.5' N	65°13.0' W	
19-Feb	0000	19°7.9' N	64°57.8' W	
	1200	18°22.3' N	64°41.6' W	
20-Feb	0000	17°44.6' N	64°16.2' W	
	1200	17°42.1' N	64°15.0' W	
21-Feb	0000	18°0.7' N	64°20.6' W	
	1200	17°49.5' N	63°51.7' W	
22-Feb	0000	18°25.9' N	63°55.7' W	
	1200	17°59.5' N	63°31.8' W	
23-Feb	0000	18°5.8' N	63°23.0' W	
	1200	17°59.6' N	63°16.2' W	
24-Feb	0000	17°24.6' N	62°59.4' W	
	1200	16°42.4' N	62°25.8' W	
25-Feb	0000	16°33.4' N	61°58.9' W	
	1200	17°0.7' N	61°47.0' W	Anchored, Falmouth Harbor, Antigua
26-Feb	0000	17°0.7' N	61°47.0' W	Anchored, Falmouth Harbor, Antigua
	1200	17°0.7' N	61°47.0' W	Anchored, Falmouth Harbor, Antigua
27-Feb	0000	17°0.7' N	61°47.0' W	Anchored, Falmouth Harbor, Antigua
	1200	17°0.7' N	61°47.0' W	Anchored, Falmouth Harbor, Antigua
28-Feb	0000	16°36.7' N	61°48.9' W	
	1200	16°39.5' N	61°45.9' W	
1-Mar	0000	16°55.5' N	61°40.4' W	
	1200	16°35.2' N	61°18.6' W	
2-Mar	0000	16°54.6' N	60°59.3' W	
	1200	16°20.1' N	60°44.7' W	
3-Mar	0000	15°36.4' N	60°46.7' W	
	1200	15°0.2' N	60°27.0' W	
4-Mar	0000	14°35.9' N	60°24.9' W	
	1200	14°0.2' N	60°24.0' W	
5-Mar	0000	13°9.4' N	60°24.5' W	
	1200	12°27.1' N	60°31.9' W	
6-Mar	0000	11°44.3' N	60°37.6' W	
	1200	12°4.1' N	61°3.7' W	
7-Mar	0000	12°33.9' N	61°29.4' W	
	1200	12°35.6' N	61°24.8' W	Anchored, Clifton, Union Island St.Vincent & the Grenadines
8-Mar	0000	12°35.6' N	61°24.8' W	Anchored, Clifton, Union Island St.Vincent & the Grenadines
	1200	12°35.6' N	61°24.8' W	Anchored, Clifton, Union Island St.Vincent & the Grenadines
9-Mar	0000	12°38.3' N	61°21.8' W	Anchored, Tobago Cays, St.Vincent & the Grenadines

	1200	12°38.3' N	61°21.8' W	Anchored, Tobago Cays, St.Vincent & the Grenadines
10-Mar	0000	13°9.5' N	61°20.5' W	
	1200	13°0.3' N	61°14.6' W	Anchored, Bequia, St.Vincent & the Grenadines
11-Mar	0000	13°0.3' N	61°14.6' W	Anchored, Bequia, St.Vincent & the Grenadines
	1200	13°0.3' N	61°14.6' W	Anchored, Bequia, St.Vincent & the Grenadines
12-Mar	0000	13°0.3' N	61°14.6' W	Anchored, Bequia, St.Vincent & the Grenadines
	1200	13°0.3' N	61°14.6' W	Anchored, Bequia, St.Vincent & the Grenadines
13-Mar	0000	13°15.5' N	61°22.6' W	
	1200	13°38.6' N	61°24.7' W	
14-Mar	0000	13°56.9' N	61°23.3' W	
	1200	13°52.5' N	61°7.5' W	
15-Mar	0000	14°35.4' N	61°20.4' W	
	1200	14°42.5' N	61°24.7' W	
16-Mar	0000	15°2.1' N	61°30.9' W	
	1200	15°20.7' N	61°46.4' W	
17-Mar	0000	16°46.3' N	61°59.2' W	
	1200	16°50.0' N	62°0.9' W	
18-Mar	0000	16°52.1' N	62°5.0' W	
	1200	16°48.0' N	62°12.6' W	
19-Mar	0000	16°48.0' N	62°12.6' W	Anchored, Montserrat
	1200	16°48.0' N	62°12.6' W	Anchored, Montserrat
20-Mar	0000	17°2.5' N	62°50.2' W	
	1200	17°7.5' N	63°5.4' W	
21-Mar	0000	17°26.3' N	64°12.7' W	
	1200	18°20.7' N	64°26.6' W	
22-Mar	0000	18°31.8' N	64°44.9' W	
	1200	18°20.5' N	64°47.9' W	Anchored, Cruz Bay, St. John, USVI
23-Mar	0000	18°21.8' N	64°45.1' W	Anchored, Francis Bay, St. John, USVI
	1200	18°21.8' N	64°45.1' W	Anchored, Francis Bay, St. John, USVI
24-Mar	0000			
	1200			Alongside, Gallows Bay, St. Croix USVI

Table 2. Ship's Complement for SSV *Corwith Cramer* Cruise C251

Nautical Staff

Elliot Rappaport	Captain	
Will McLean	Chief Mate	
Kirsten Johnsrud	2 nd Mate	
Kevin Murray	3 rd Mate	
Joe Messere	Chief Engineer	
Trevor Kauffmann	Assistant Engineer	
Don Collasius	Port Engineer	Leg I
Jenny Ray	Steward	
Becky Slattery	Assistant Steward	

Scientific Staff

Chuck Lea	Chief Scientist
Maia Theophanis	First Assistant Scientist
Matt Hirsch	Second Assistant Scientist
Janet Bering	Third Assistant Scientist

Deck Hands

Matt Harrison
 Jess Hartsock
 Gabrielle Page
 Thomas Young

Visitors

Rita Harrison Observer, St. Lucia

Students

Max Acheson	Rollins College
Brandon Donnelly Legs I,II	University of Alaska, Fairbanks
Meryl Friets	Lesley University
Maureen 'Mo' Hayden	University of Rhode Island
Matthew Hurst	University Of Massachusetts, Dartmouth
Kaitlyn Ladao	Lake Forest College
Kyle McNulty	Denison University
Jade Moret	Colorado Mesa University
Lenna M. Quackenbush	Worcester Polytechnic Institute
Colby Schindel	Rollins College
S. Anne Schulberg	Carleton College
Courcelle Stark	Falmouth High School
Emily Carol Tradd	University of Rhode Island

Table 3. Student Projects Aboard C251.

Title	Author(s)
Distributions and Magnitudes of Water Masses in the Lesser Antilles during the Early Spring of 2014	Max Acheson, Colby Schindel
Biomass and Diversity of Neustonic Zooplankton in Subtropical and Tropical Waters of the Lesser Antilles	Jade Moret
The Distribution of Leptocephali in the Lesser Antilles in Early Spring	Kaitlyn Ladao, Anne Schulberg
Zoogeography of Myctophids in the Southern Sargasso Sea and the Caribbean	Maureen Hayden
The Vertical Distribution of <i>Limacina bulimoides</i> in the Greater and Lesser Antilles	Meryl Friets and Courcelle Stark
Trichodesmium: Distribution patterns between Subtropical and Tropical Waters	Matthew Hurst
Population Distribution of <i>Halobates micans</i> in the Lesser Antilles During Early Spring	Kyle McNulty and Emily Tradd
Vertical Distribution Of Chlorophyll In Relation To Nitrate And Phosphate	Lenna Quackenbush
Vertical Distribution Of Chlorophyll In Relation To Nitrate And Phosphate	Brandon Donnelly

Data and Sampling Appendices:

APPENDIX

A

STATION INFORMATION SUMMARY OF C251

STATION	DATE	TIME	GENERAL LOCALE	LAT.	LONG.	EQUIPMENT	SURFACE STATION
C251		(Local)		(°N)	(°W)		
001	16-Feb-14	0025	Transition Zone	19°20.7'	66°5.1'	Neuston net	SS-001
002	16-Feb-14	0956	Transition Zone	19°47.6'	65°56.1'	Neuston net	002-HC

						CTD	
						Niskin bottles	
						Secchi Disc	
						Meter net	
003	17-Feb-14	0000	Transition Zone	20°35.7'	65°48.6'	Neuston net	SS-002
004	17-Feb-14	0940	Transition Zone	21°8.4'	65°48.0'	Neuston net	SS-003
						CTD	
						Secchi Disc	
						Meter net	
						Phytoplankton net	
005	18-Feb-14	0009	Transition Zone	20°19.8'	65°19.7'	Neuston net	SS-004
006	18-Feb-14	0940	Transition Zone	19°45.7'	65°10.7'	Neuston net	SS-005
						CTD	
						Secchi Disc	
						Meter net	
007	19-Feb-14	0010	Transition Zone	19°7.7'	64°57.8'	Neuston net	SS-006
			Sir Francis Drake				
008	19-Feb-14	1325	Passage	18°22.5'	64°36.3'	Neuston net	SS-007
009	20-Feb-14	0017	NE Caribbean	17°43.8'	64°16.8'	Neuston net	SS-008
							010-HC
010	20-Feb-14	0946	NE Caribbean	17°44.3'	64°13.2'	Neuston net	#13
						CTD	
						Niskin bottles	
						Secchi Disc	
						Meter net	
						Phytoplankton net	
011	20-Feb-14	2132	NE Caribbean	18°2.5'	64°19.2'	Neuston net	SS-009
						Meter net	
						2-Meter net	
012	20-Feb-14	1209	NE Caribbean	17°49.2'	63°51.8'	Neuston net	SS-010
013	22-Feb-14	0001	NE Caribbean	18°25.9'	63°55.1'	Neuston net	SS-011
014	22-Feb-14	0934	NE Caribbean	18°0.9'	63°28.2'	Neuston net	SS-012
						CTD	
						Secchi Disc	
						Meter net	
015	22-Feb-14	2352	NE Caribbean	18°5.9'	63°22.9'	Neuston net	SS-013
016	23-Feb-14	1159	NE Caribbean	17°59.6'	63°16.2'	Neuston net	SS-014
017	24-Feb-14	0013	NE Caribbean	17°23.8'	62°58.9'	Neuston net	SS-015
018	24-Feb-14	0931	NE Caribbean	16°45.9'	62°24.2'	Neuston net	SS-016
						CTD	
						Secchi Disc	
						Meter net	
019	25-Feb-14	0016	NE Caribbean	16°33.6'	61°58.7'	Neuston net	SS-017
020	28-Feb-14	0020	NE Caribbean	16°36.9'	61°49.0'	Neuston net	SS-018
021	28-Feb-14	0926	Transition Zone	16°44.0'	61°44.3'	Neuston net	SS-019
						CTD	
						Secchi Disc	
						Meter net	
022	1-Mar-14	2351	Transition Zone	16°55.9'	61°40.1'	Neuston net	SS-020
023	1-Mar-14	1155	Transition Zone	16°30.5'	61°6.7'	Neuston net	SS-021
024	2-Mar-14	0002	Transition Zone	16°54.6'	60°59.3'	Neuston net	SS-022
025	2-Mar-14	0930	Transition Zone	16°21.8'	60°42.6'	Neuston net	SS-023

						CTD	
						Secchi Disc	
						Meter net	
026	3-Mar-14	0008	Transition Zone	15°35.8'	60°46.4'	Neuston net	SS-024
027	3-Mar-14	0839	Tropical Water	15°2.3'	60°28.1'	CTD	
						Secchi Disc	
						Meter net	
028	3-Mar-14	1201	Tropical Water	15°0.2'	60°27.0'	Neuston net	SS-025
029	4-Mar-14	0008	Tropical Water	14°35.5'	60°24.8'	Neuston net	SS-026
							020-HC
030	4-Mar-14	0919	Tropical Water	14°1.9'	60°22.9'	Neuston net	#13
						CTD	
						Niskin bottles	
						Secchi Disc	
						Meter net	
						Phytoplankton net	
031	5-Mar-14	0000	Tropical Water	13°9.4'	60°24.5'	Neuston net	SS-027
032	5-Mar-14	0934	Tropical Water	12°28.1'	60°27.9'	Neuston net	SS-028
						CTD	
						Secchi Disc	
						Meter net	
033	5-Mar-14	2026	Tropical Water	11°54.0'	60°34.8'	Meter net	
						2-Meter net	
034	6-Mar-14	0013	Tropical Water	11°44.5'	60°38.6'	Neuston net	SS-029
							035-HC
035	6-Mar-14	0929	Tropical Water	12°4.3'	60°57.0'	Neuston net	#13
						CTD	
						Niskin bottles	
						Secchi Disc	
						Meter net	
						Phytoplankton net	
036	7-Mar-14	0006	SE Caribbean	12°33.9'	61°29.8'	Neuston net	SS-030
037	9-Mar-14	2359	SE Caribbean	13°9.7'	61°20.4'	Neuston net	SS-031
038	13-Mar-14	1040	SE Caribbean	13°38.3'	61°22.1'	Neuston net	SS-032
						CTD	
						Secchi Disc	
039	14-Mar-14	0003	SE Caribbean	13°56.9'	61°23.3'	Neuston net	SS-033
040	14-Mar-14	1217	SE Caribbean	13°52.5'	61°7.9'	CTD	
041	14-Mar-14	2357	SE Caribbean	14°35.1'	61°20.3'	Neuston net	SS-034
042	15-Mar-14	0926	SE Caribbean	14°42.5'	61°24.2'	CTD	
						Secchi Disc	
043	16-Mar-14	0003	NE Caribbean	15°2.1'	61°30.9'	Neuston net	SS-035
044	16-Mar-14	0855	NE Caribbean	15°19.8'	61°44.7'	Neuston net	SS-036
						CTD	
						Secchi Disc	
045	17-Mar-14	0012	NE Caribbean	16°8.3'	61°57.2'	Neuston net	SS-037
046	17-Mar-14	0931	NE Caribbean	16°46.5'	61°58.8'	CTD	
						Secchi Disc	
047	18-Mar-14	0004	NE Caribbean	16°57.2'	62°5.0'	Neuston net	SS-038
048	18-Mar-14	1034	NE Caribbean	16°48.1'	62°12.6'	Shipek Grab	
049	20-Mar-14	1635	NE Caribbean	17°7.0'	64°6.1'	CTD	
050	20-Mar-14	2353	NE Caribbean	17°26.5'	64°12.6'	Neuston net	SS-039

APPENDIX B

SURFACE STATION INFORMATION C251

Station	Date	Time	Log	Latitude	Longitude	Temp.	Salinity	NO ₃	PO ₄	SiO ₂	CDOM <i>in vivo</i> Fluor	Chlor. <i>in vivo</i> Fluor
SS-		(local)	(nm)	° ' N	° ' W	(°C)	(PSU)	(μM)	(μM)	(μM)	(V)	(V)
001	16-Feb-14	0040	45.4	19°20.2' N	66°5.6' W	26.5	35.74	0.098	0.154	-	92.0	1129.1
002-HC #13	16-Feb-14	1050	75.0	19°47.1' N	65°57.1' W	26.2	35.81	0.175	0.084	-	89.0	971.8
002	17-Feb-14	0018	120.2	20°25.6' N	65°49.0' W	25.8	36.20	0.061	0.084	15.603	85.4	985.8
003	17-Feb-14	1200	148.9	21°7.4' N	65°50.5' W	26.1	35.97	0.120	0.173	-	85.5	985.5
004	18-Feb-14	0026	203.3	20°19.1' N	65°14.7' W	25.9	36.25	0.046	0.084	11.362	85.5	952.7
005	18-Feb-14	1049	238.8	19°44.8' N	65°12.2' W	26.1	35.90	0.106	0.205	-	86.8	953.4
006	19-Feb-14	0027	278.0	19°7.0' N	64°58.0' W	26.2	35.93	0.101	0.224	8.473	89.6	1029.1
007	19-Feb-14	1343	-	18°22.7' N	64°35.5' W	26.4	35.96	0.120	0.238	-	92.2	1324.9
008	20-Feb-14	0031	341.1	17°43.1' N	64°16.8' W	26.1	36.08	0.108	0.140	-	89.8	1239.3
010-HC #13	20-Feb-14	1041	375.1	17°43.6' N	64°14.0' W	26.3	36.19	0.668	0.056	-	89.5	1185.7
009	20-Feb-14	2313	403.3	17°59.2' N	64°20.6' W	26.1	36.04	0.043	0.145	10.832	88.3	1245.7
010	21-Feb-14	1220	449.5	17°48.8' N	63°52.0' W	26.3	36.20	0.208	0.215	-	89.5	1322.6
011	22-Feb-14	0023	485.1	18°25.1' N	63°55.4' W	26.1	36.99	0.157	0.159	-	86.1	1465.1
012	22-Feb-14	1121	520.0	18°0.2' N	63°30.7' W	26.4	36.25	0.073	0.173	-	88.5	1510.6
013	23-Feb-14	0002	559.9	18°5.8' N	63°23.1' W	26.1	36.20	0.080	0.028	10.932	91.1	2009.6
014	23-Feb-14	1222	600.0	17°58.9' N	63°16.7' W	26.4	36.31	0.104	0.056	-	89.6	1658.4
015	24-Feb-14	0033	645.7	17°23.3' N	62°59.1' W	26.5	36.02	0.130	0.070	-	89.5	748.8
016	24-Feb-14	1006	689.2	16°45.6' N	62°24.6' W	26.6	36.04	0.144	0.131	-	142.7	823.7
017	25-Feb-14	0024	742.1	16°33.2' N	61°58.8' W	26.4	36.04	0.156	0.098	12.422	89.7	829.1
018	28-Feb-14	0025	816.0	16°36.4' N	61°49.0' W	26.4	36.26	0.068	0.154	-	89.8	859.0
019	28-Feb-14	1109	849.1	16°42.3' N	61°45.8' W	26.4	36.22	0.029	0.126	-	89.6	728.4
020	1-Mar-14	2359	898.5	16°55.2' N	61°40.6' W	26.2	36.16	0.048	0.103	16.627	87.6	777.8
021	1-Mar-14	1214	947.8	16°30.1' N	61°7.1' W	26.3	36.09	0.083	0.177	-	89.5	735.9
022	2-Mar-14	0021	978.9	16°54.2' N	60°59.7' W	26.1	36.41	0.117	0.322	9.680	85.3	725.9
023	2-Mar-14	1110	1013.0	16°21.5' N	60°44.1' W	26.3	36.08	0.105	0.117	-	85.5	704.8
024	3-Mar-14	0026	1055.8	15°35.3' N	60°46.4' W	26.7	35.94	0.097	0.205	11.261	95.5	1034.9
025	3-Mar-14	1215	1096.4	14°59.8' N	60°27.1' W	26.9	35.99	0.038	0.051	12.102	92.3	724.3
026	4-Mar-14	0018	1133.1	14°35.0' N	60°24.5' W	26.8	35.99	0.005	0.079	11.691	94.7	828.2
030-HC #13	4-Mar-14	1014	1166.0	14°1.9' N	60°21.6' W	26.5	35.81	0.050	0.070	-	92.3	771.1
027	5-Mar-14	0011	1213.4	13°8.9' N	60°24.9' W	26.7	35.92	0.063	0.112	4.159	95.4	912.2
028	5-Mar-14	1116	1251.2	12°28.1' N	60°31.1' W	26.5	33.69	0.509	0.233	-	90.2	855.9
029	6-Mar-14	0016	1301.3	11°44.5' N	60°38.6' W	27.0	35.61	0.198	0.313	9.132	109.0	1029.1
035-HC #13	6-Mar-14	1044	-	12°5.0' N	61°0.9' W	27.0	35.40	0.087	0.098	11.325	104.0	819.5
030	7-Mar-14	0025	1398.2	12°33.6' N	61°30.2' W	26.8	35.55	0.216	0.121	11.910	109.4	1309.1
031	10-Mar-14	0005	1452.5	13°9.6' N	61°20.5' W	26.7	35.45	-	-	-	102.8	1526.9
032	13-Mar-14	1204	1519.1	13°38.6' N	61°24.7' W	26.8	35.36	-	-	-	99.6	721.3
033	14-Mar-14	0007	1559.7	13°56.8' N	61°23.3' W	26.6	35.03	-	-	-	103.7	765.2
034	15-Mar-14	0018	1635.2	14°35.5' N	61°20.5' W	26.3	35.60	-	-	-	95.6	761.2
035	16-Mar-14	0004	1660.2	15°2.1' N	61°30.9' W	26.5	35.93	-	-	-	90.3	736.6
036	16-Mar-14	1055	-	15°20.1' N	61°45.8' W	26.9	35.95	-	-	-	89.5	675.3
037	17-Mar-14	0013	1713.5	16°8.3' N	61°57.2' W	26.6	35.96	-	-	-	89.3	771.2
038	18-Mar-14	0020	1806.0	16°56.6' N	62°5.2' W	26.2	36.33	-	-	-	85.1	796.4
039	21-Mar-14	0014	1952.1	17°25.8' N	64°12.9' W	26.8	36.00	-	-	-	88.9	1051.9

APPENDIX D

C251 HYDROCAST DATA. Dash (-) indicates no value. Station locations are given in Appendix A.

STATION	BOT- TLE	DEPTH	TEMP.	SAL.	DENSITY	PAR	O ₂	PO ₄	NO ₃	CHLOR.	CHLOR.
		(m)	(°C)	(PSU)	(σ _t)	%0m illum	probe (ml/l)	(µg/l)	(µg/l)	(µg/l)	(volts)
C251											
002	13	0	26.2	35.81	23.6	100	4.6	0.08	0.175	0.261	0.420
Transition Water	12	25	26.0	35.79	23.6	31.4	4.6	0.07	0.116	0.017	0.268
19°20.7' N	11	50	25.9	36.09	23.9	12.9	4.6	0.04	0.097	0.031	0.243
66°4.7' W	10	75	25.8	36.35	24.1	5.3	4.6	0.12	0.078	0.043	0.269
Secchi depth 35m	9	95	25.9	36.90	24.5	2.4	4.7	0.03	0.267	0.088	0.270
Secchi 1%=94m	8	99	25.8	37.05	24.7	1.8	4.7	0.00	0.203	0.107	0.272
PAR 1%=110m	7	124	24.4	37.15	25.1	0.1	4.6	0.02	0.125	0.385	0.284
	6	149	23.6	37.20	25.4	0.0	4.2	0.11	0.419	0.187	0.295
	5	198	21.1	36.94	26.0	0.0	4.0	0.08	1.280	-	-
	4	346	16.4	36.22	26.6	0.0	3.4	0.60	7.876	-	-
	3	496	13.3	35.76	26.9	0.0	3.2	0.80	11.889	-	-
	2	744	8.4	35.06	27.3	0.0	2.9	1.36	14.565	-	-
	1	893	6.5	34.86	27.4	0.0	3.1	1.41	24.597	-	-
010	13	0	26.3	36.20	23.9	100	4.6	0.04	-	0.111	0.104
Northeast Caribbean	12	25	26.1	36.11	23.8	26.6	4.5	0.12	0.138	0.040	0.056
Sea	11	50	26.1	36.13	23.9	22.1	4.5		0.280	0.088	0.060
17°43.6'N	9	95	26.0	37.09	24.6	2.7	4.1	0.16	0.193	0.358	0.080
64°14.0'W	8	100	25.2	37.10	24.9	1.7	4.1	0.08	0.244	0.317	0.078
Secchi depth 30m	7	124	24.0	37.19	25.3	0.0	3.9	0.12	0.999	0.099	0.061
Secchi 1%=81m	6	150	22.3	37.06	25.7	0.0	3.8	0.12	1.920	0.075	0.056
PAR 1%=105	5	198	19.6	36.79	26.2	0.0	3.6	0.22	4.692	-	0.054
	4	347	15.6	36.12	26.7	0.0	3.4	0.67	5.802	-	-
	3	496	11.0	35.33	27.0	0.0	2.9	1.35	16.571	-	-
	2	744	6.9	34.82	27.3	0.0	2.9	1.37	18.845	-	-
	1	893	5.7	34.92	27.5	0.0	3.5	1.59	21.922	-	-
030	13	0	26.5	35.81		100	4.6	0.07	0.050	0.237	0.068
Tropical Water	12	25	26.4	35.82	23.5	26.1	4.6	0.04	0.024	0.159	0.062
14°1.9' N	11	50	26.6	36.08	23.7	8.4	4.5	0.07	0.030	0.294	0.087
60°21.1' W	10	74	26.7	36.23	23.7	0.4	4.4	0.08	0.027	0.601	0.083
Secchi depth 23m	9	84	26.7	36.23	23.8	0.0	4.4	0.08	0.018	0.584	0.072
Secchi 1%=62m	8	100	26.5	36.38	23.9	0.0	4.2	0.13	0.303	0.261	0.065
PAR 1%=70m	7	125	25.1	36.37	24.3	0.0	3.9	0.25	2.022	0.181	0.061
	6	149	23.8	36.45	24.8	0.0	3.8	0.31	4.221	0.063	0.058
	5	199	19.6	36.34	25.9		3.4	0.51	11.489	-	0.057
	4	348	9.8	35.01	27.0		2.8	1.56	24.176	-	-
	3	501	7.4	34.72	27.1		2.7	-	-	-	-
	2	774	5.7	34.63	27.3		2.9	1.91	32.823	-	-

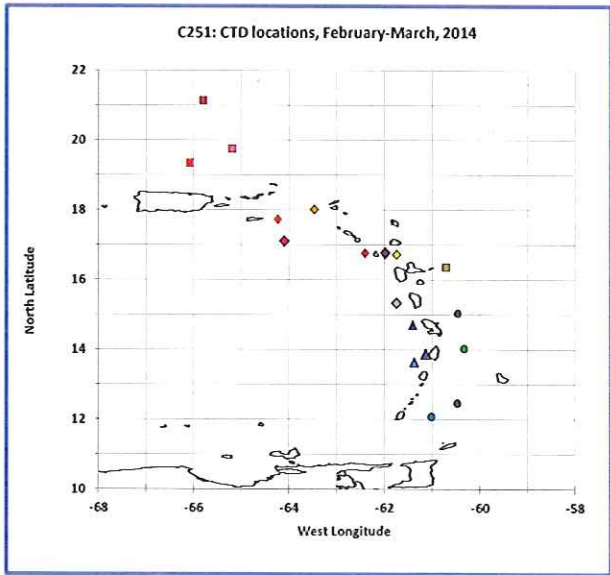
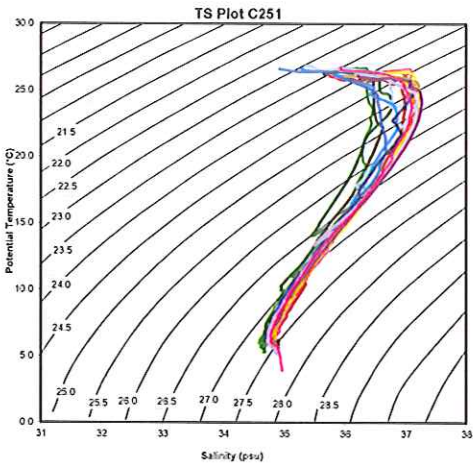
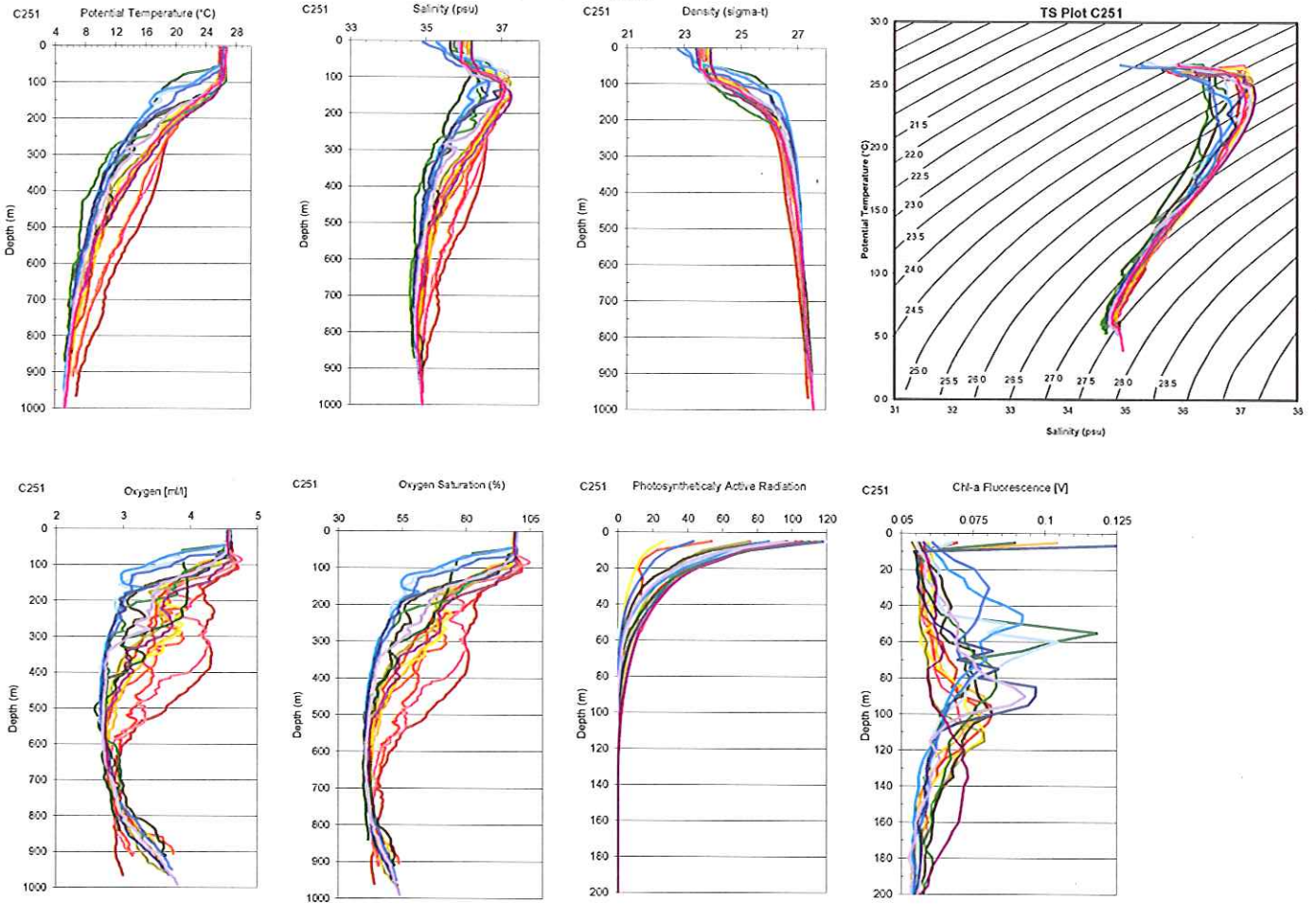
APPENDIX D

C251 CTD AND SECCHI DISC STATION SUMMARY

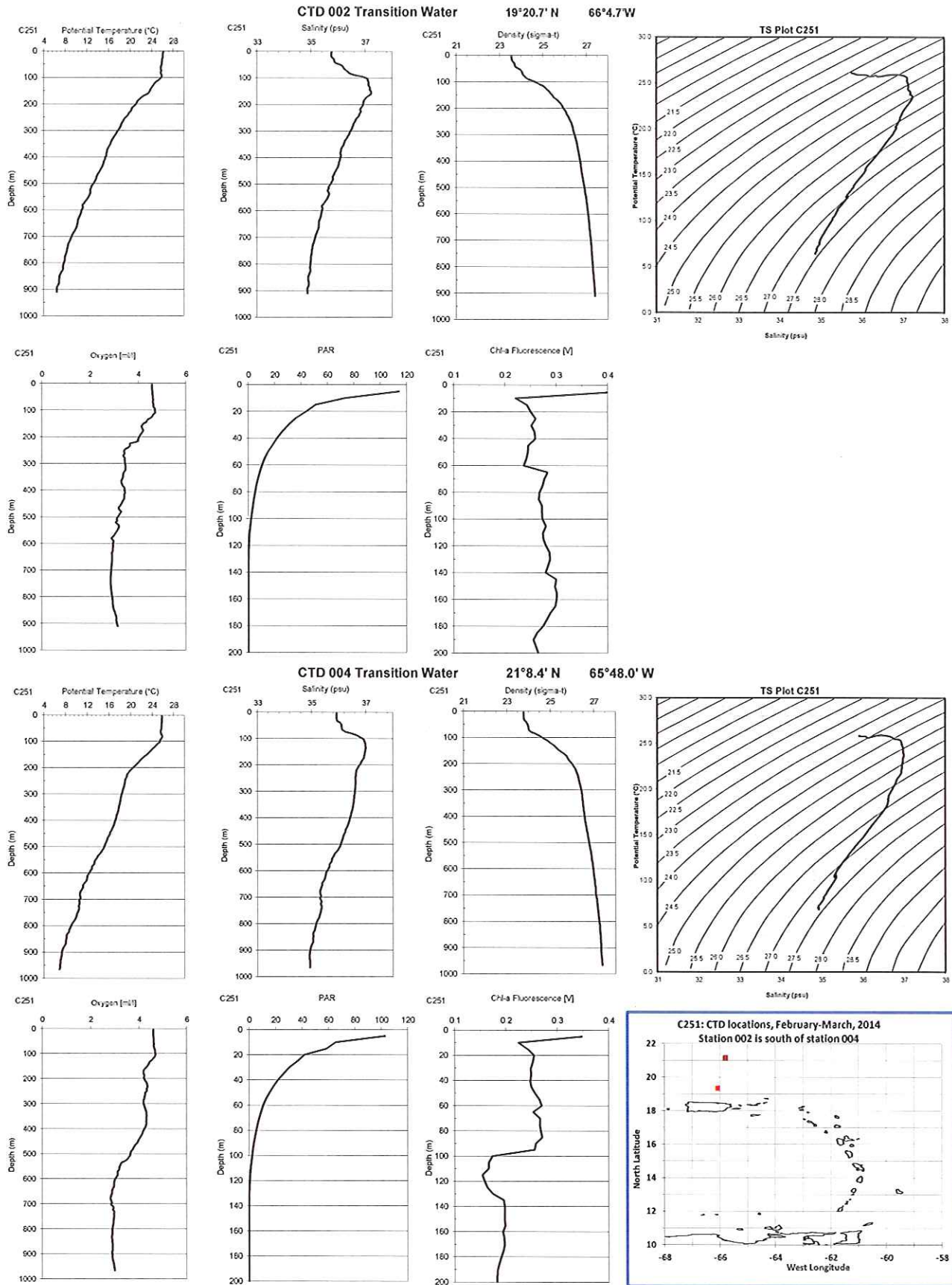
STATION C251	DATE 2014	LAT. (°N)	LONG. (°W)	CAST DEPTH (m)	GENERAL LOCATION	Secchi Depth (m)	SD 1% Depth (m)
C251 002	2/16/2014	19°20.7' N	66°4.7' W	910	Subtropical-Tropical Transition Zone	35	94
C251 004	2/17/2014	21°8.4' N	65°48.0' W	965	Subtropical-Tropical Transition Zone	34	91
C251 006	2/18/2014	19°45.3' N	65°11.5' W	905	Subtropical-Tropical Transition Zone	32	86
C251 010	2/20/2014	17°43.6' N	64°14.0' W	905	North Eastern Caribbean Sea	30	81
C251 014	2/22/2014	18°0.9' N	63°28.2' W	910	North Eastern Caribbean Sea	32	86
C251 018	2/24/2014	16°45.7' N	62°24.4' W	950	North Eastern Caribbean Sea	30	81
C251 021	2/28/2014	16°43.8' N	61°44.8' W	645	North Eastern Caribbean Sea	32	86
C251 025	3/2/2014	16°21.8' N	60°42.4' W	965	Subtropical-Tropical Transition Zone	26	70
C251 027	3/3/2014	15°2.3' N	60°28.1' W	910	Tropical Water	23	62
C251 030	3/4/2014	14°1.9' N	60°20.1' W	870	Tropical Water	23	62
C251 032	3/5/2014	12°28.2' N	60°28.6' W	840	Tropical Water	28	75
C251 035	3/6/2014	12°5.0' N	61°0.9' W	540	Tropical Water	22	59
C251 038	3/13/2014	13°38.4' N	61°22.5' W	695	South Eastern Caribbean Sea	22	59
C251 040	3/14/2014	13°52.5' N	61°7.9' W	950	South Eastern Caribbean Sea	-	-
C251 042	3/15/2014	14°42.8' N	61°24.5' W	965	South Eastern Caribbean Sea	36	97
C251 044	3/16/2014	15°19.9' N	61°44.8' W	990	North Eastern Caribbean Sea	25	67
C251 046	3/17/2014	16°46.3' N	61°59.2' W	685	North Eastern Caribbean Sea	29	78
C251 049	3/20/2014	17°7.0' N	64°6.1' W	2130	North Eastern Caribbean Sea	-	-

APPENDIX F. C251 CTD STATION PROFILES

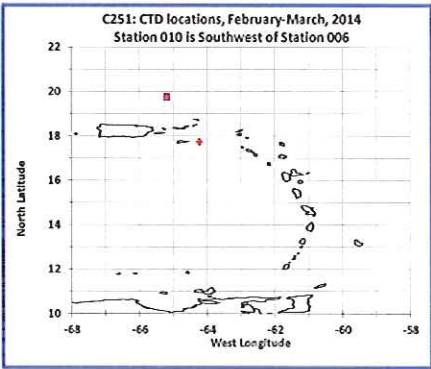
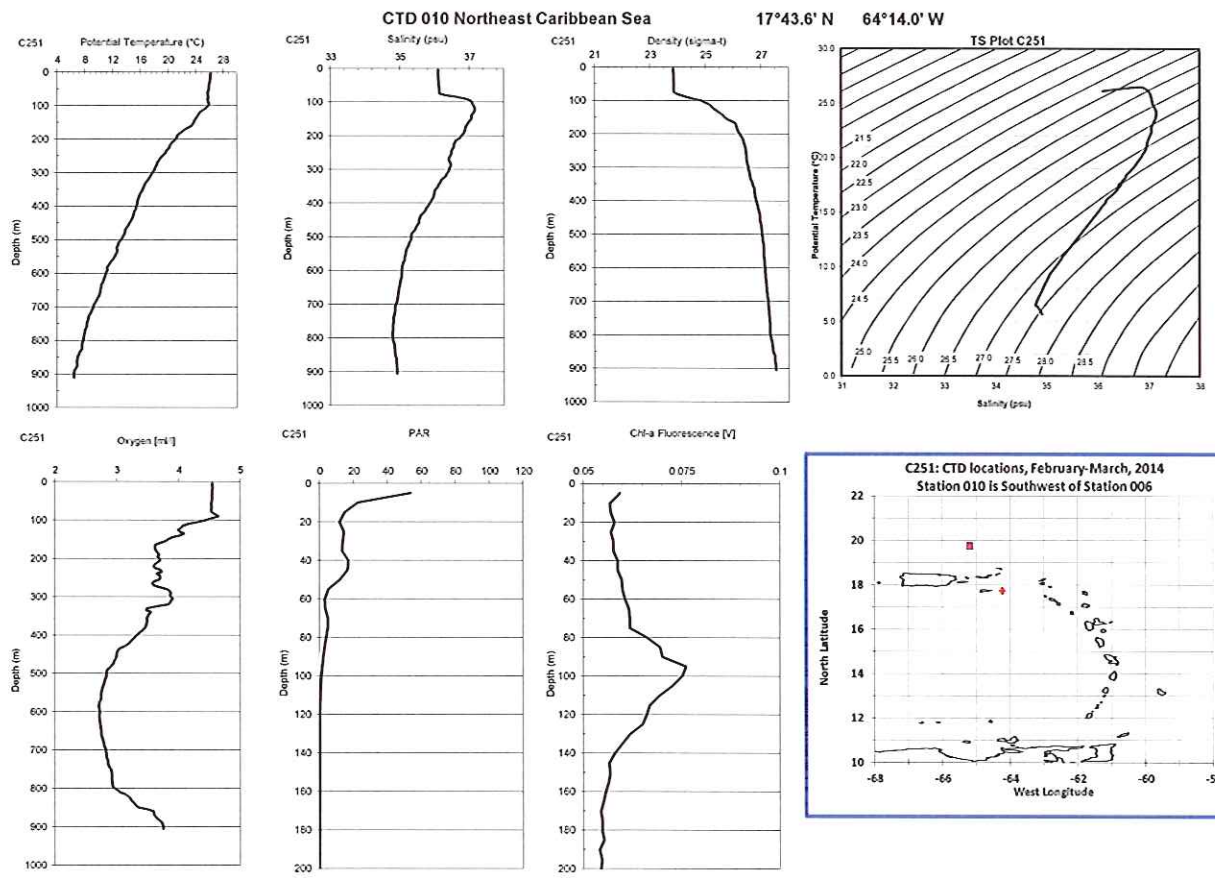
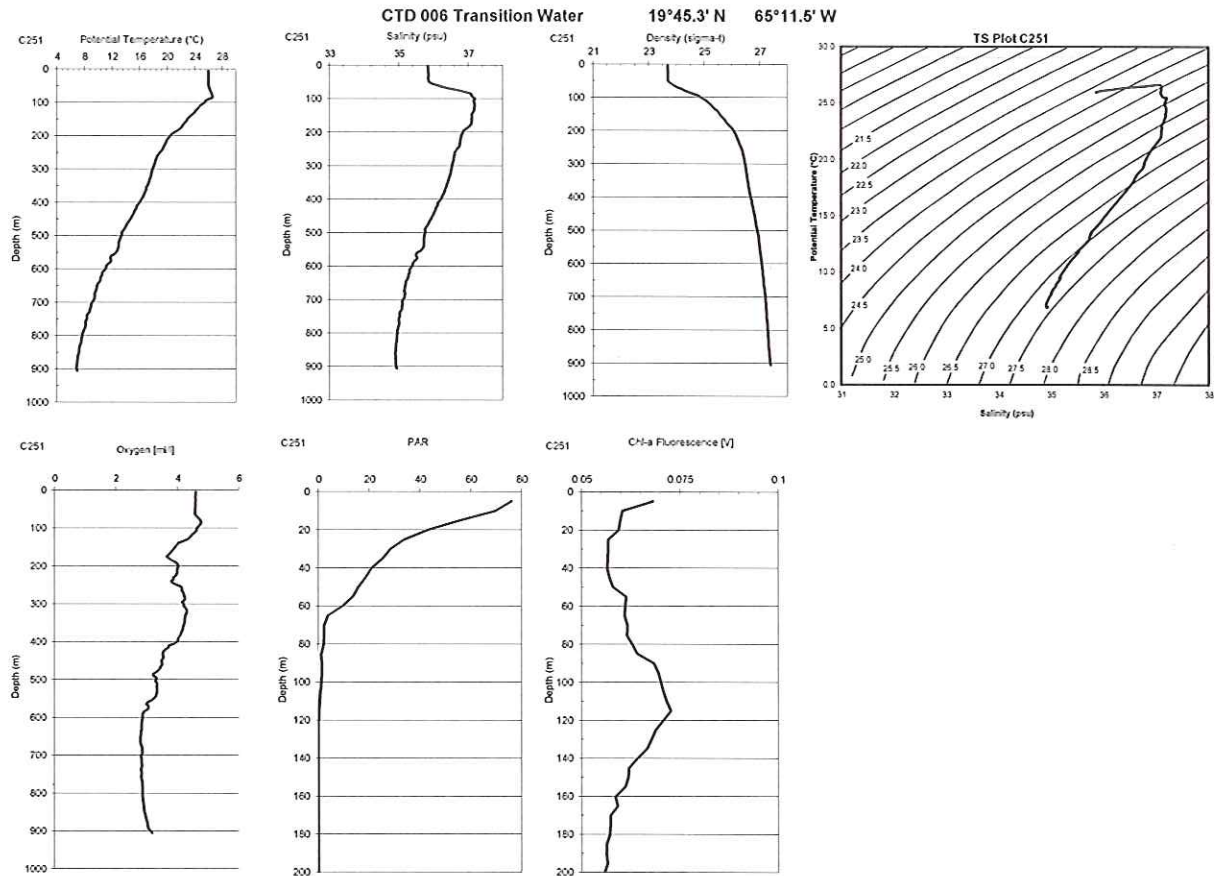
All C251 CTD Stations



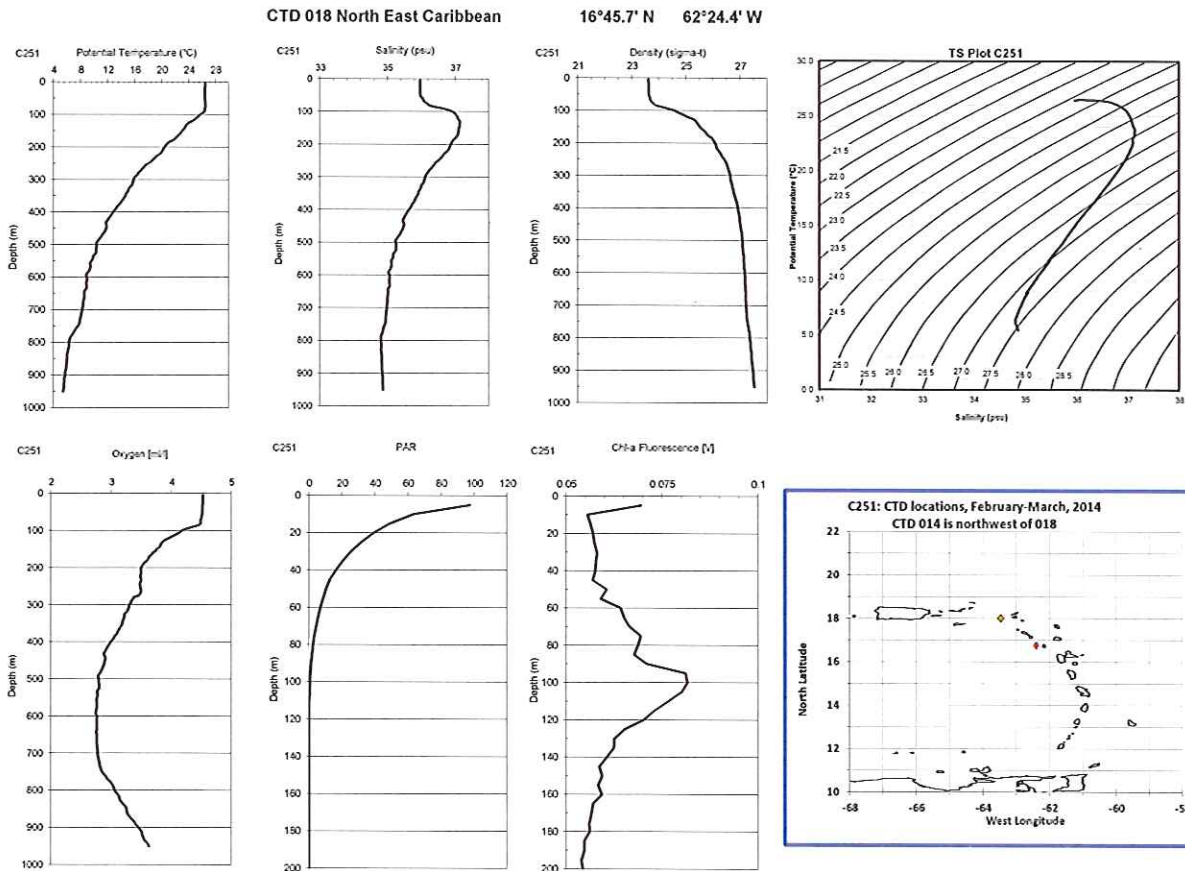
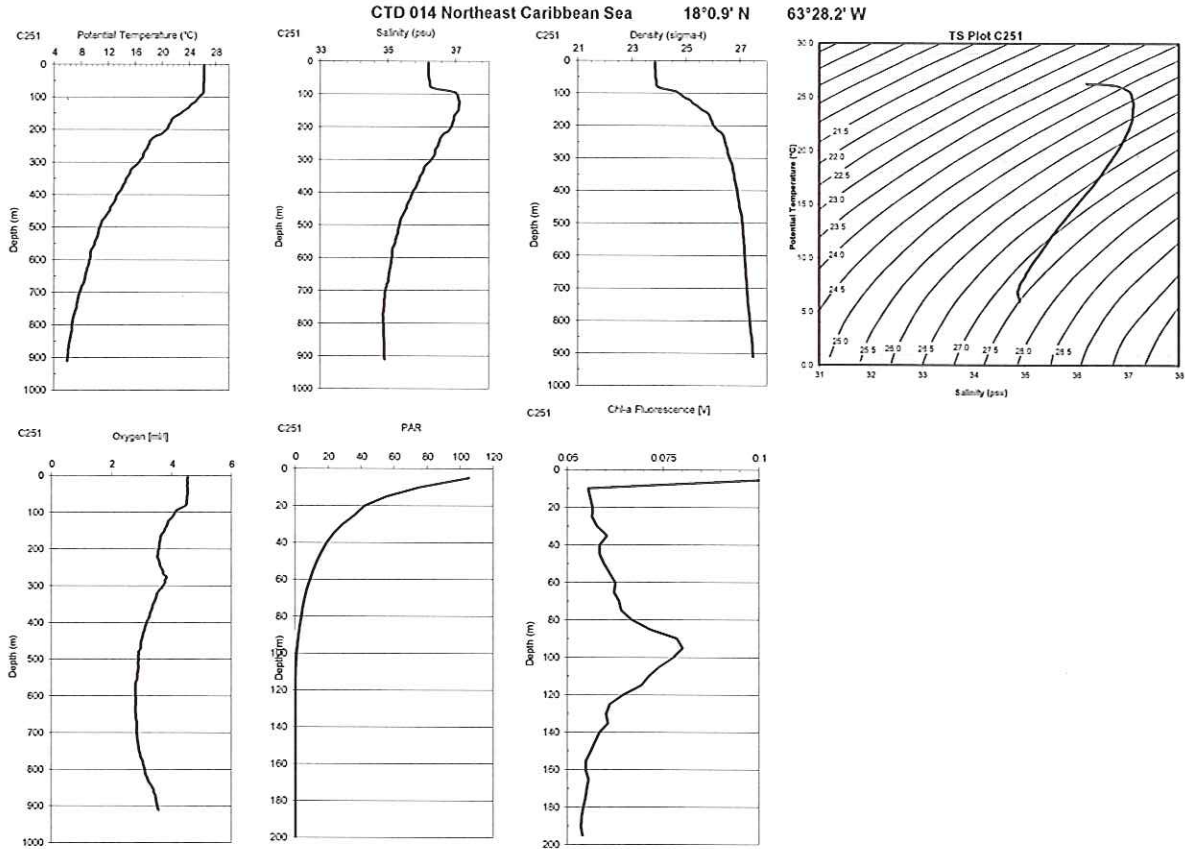
APPENDIX F. C251 CTD STATION PROFILES



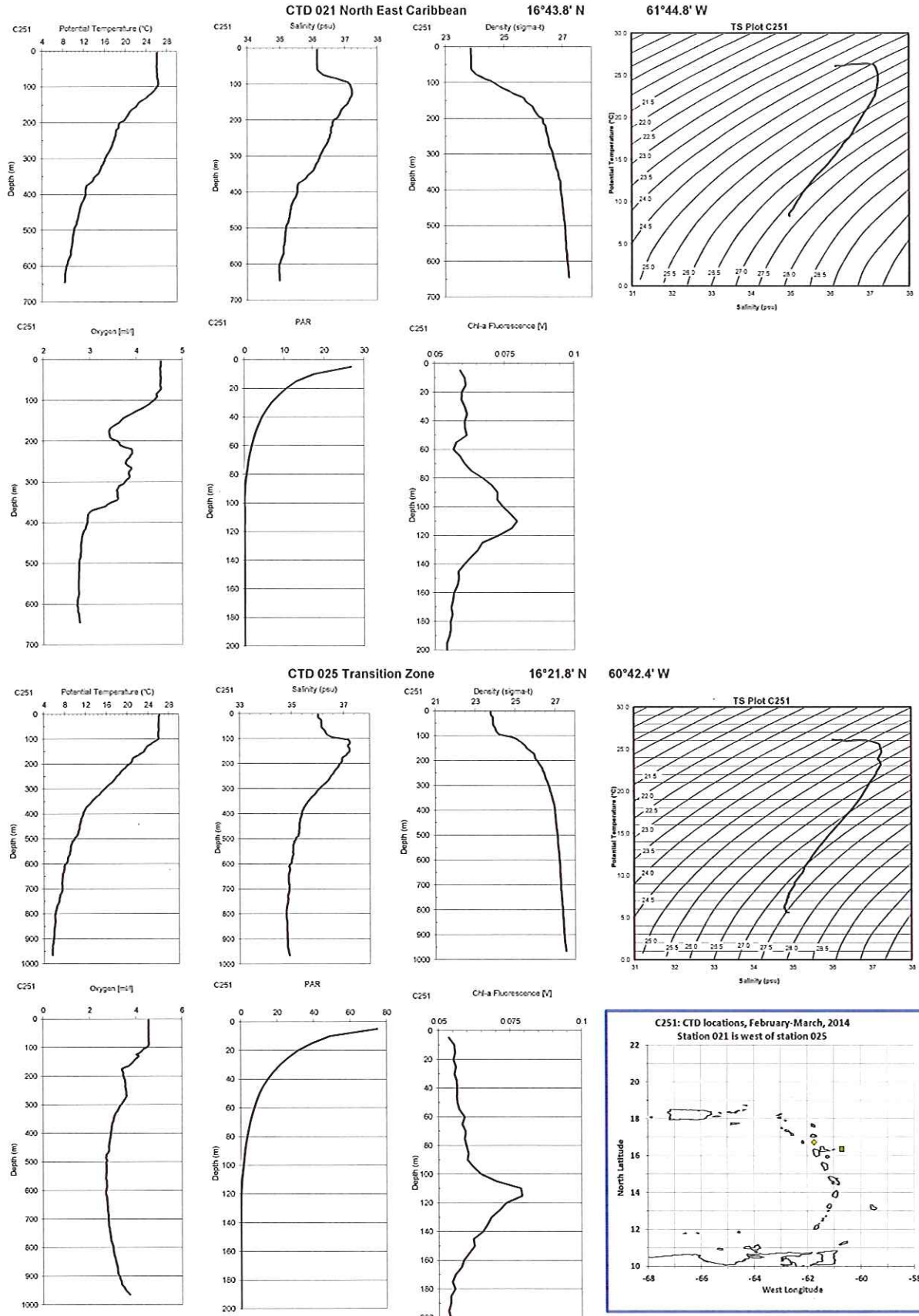
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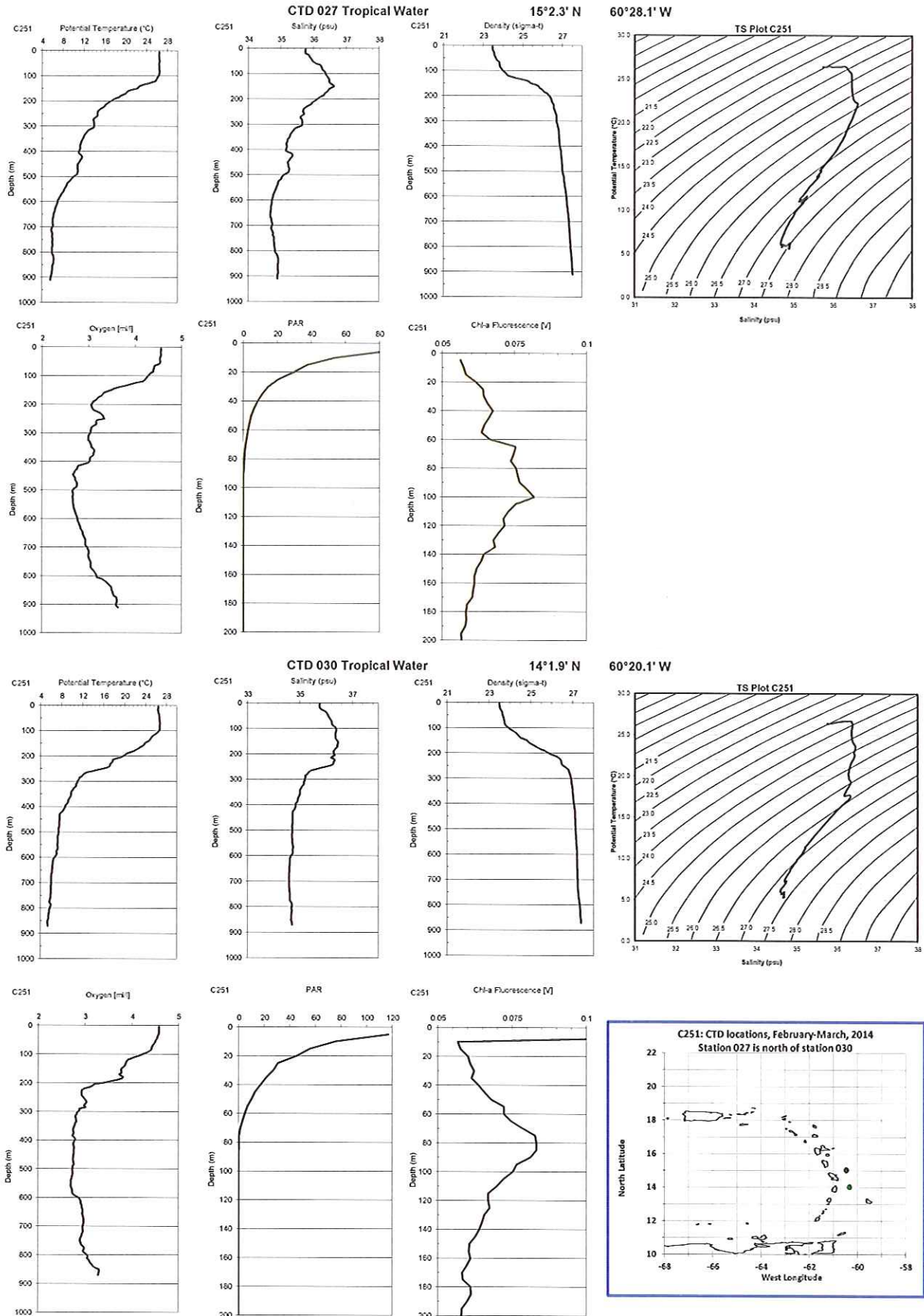
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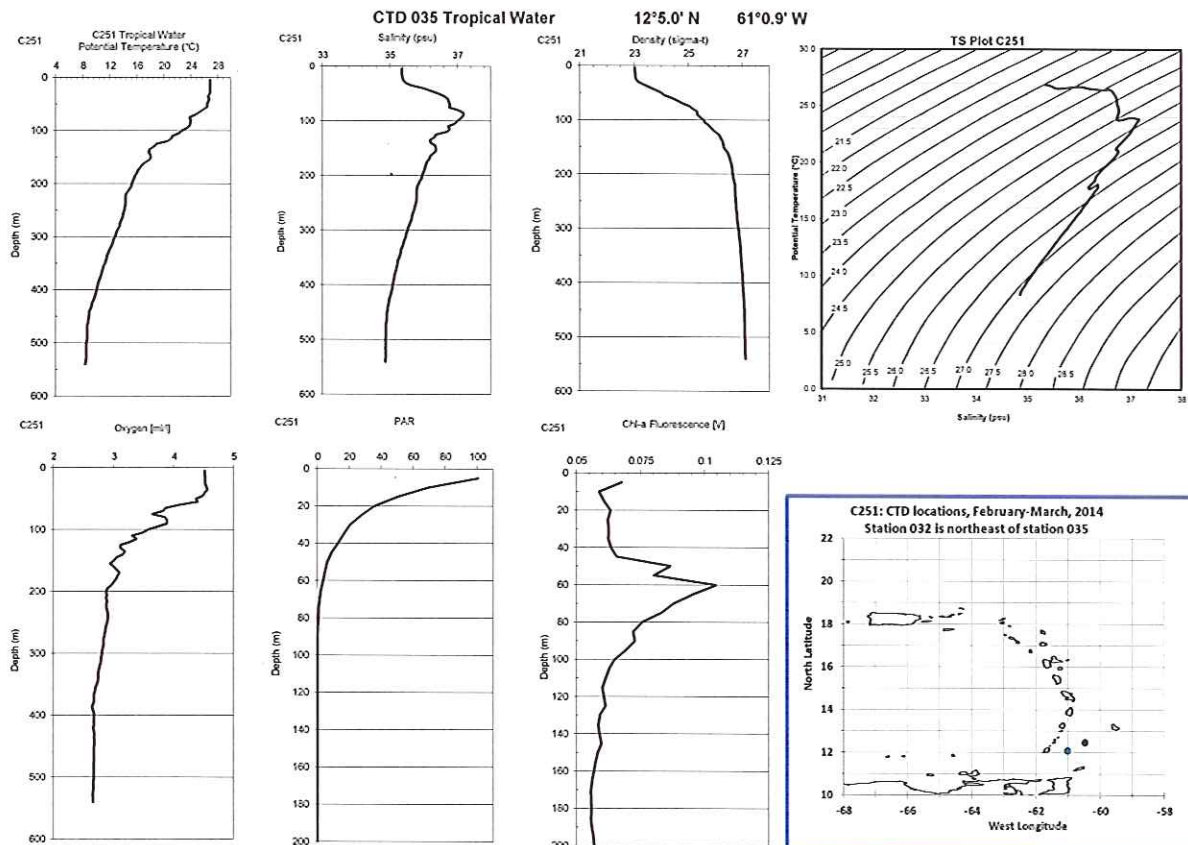
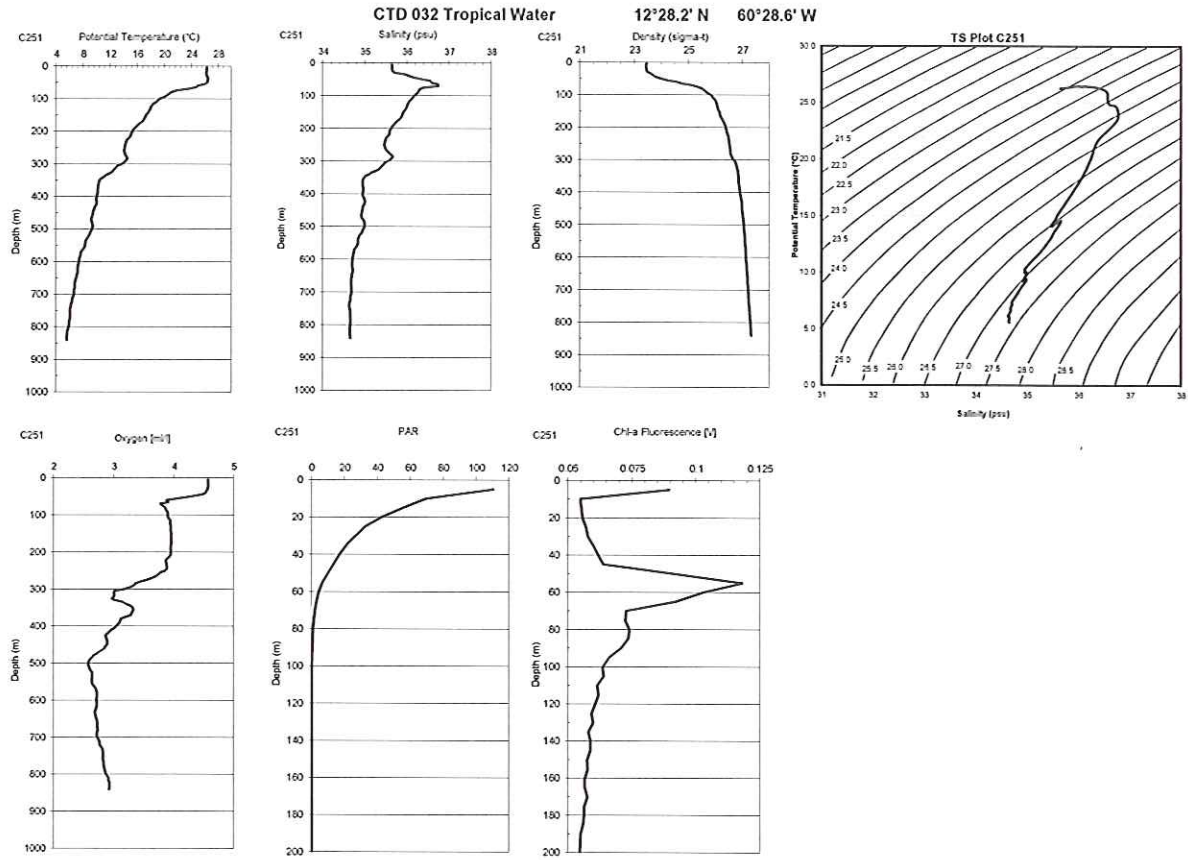
APPENDIX F. C251 CTD STATION PROFILES



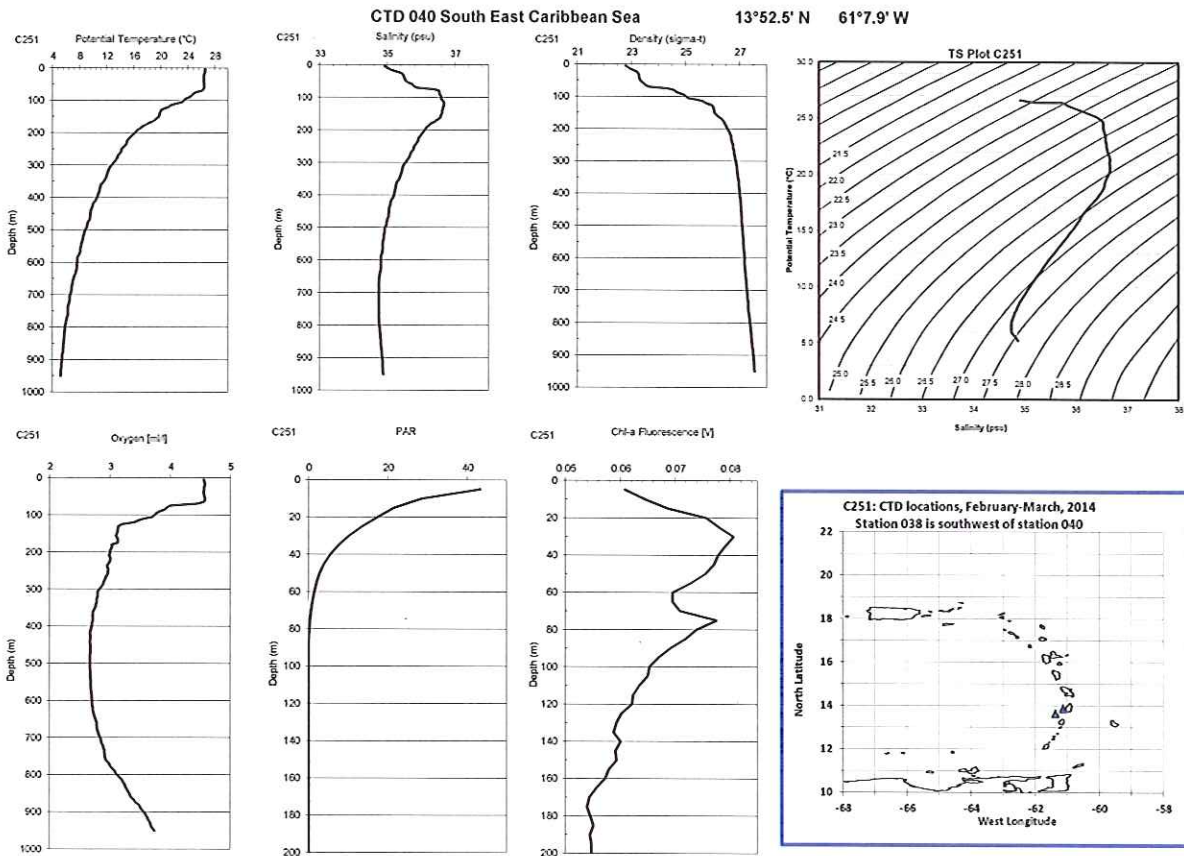
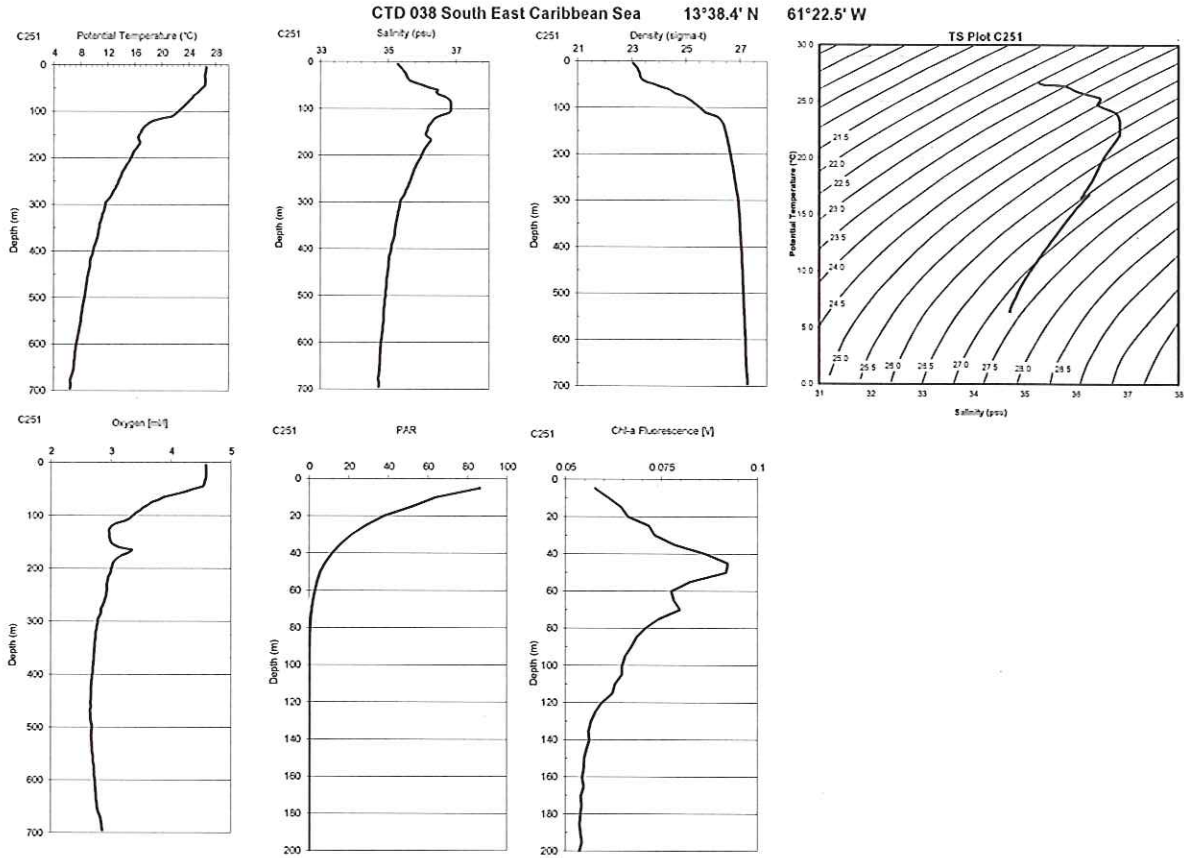
APPENDIX F. C251 CTD STATION PROFILES



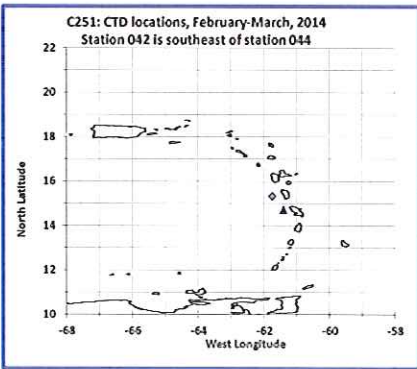
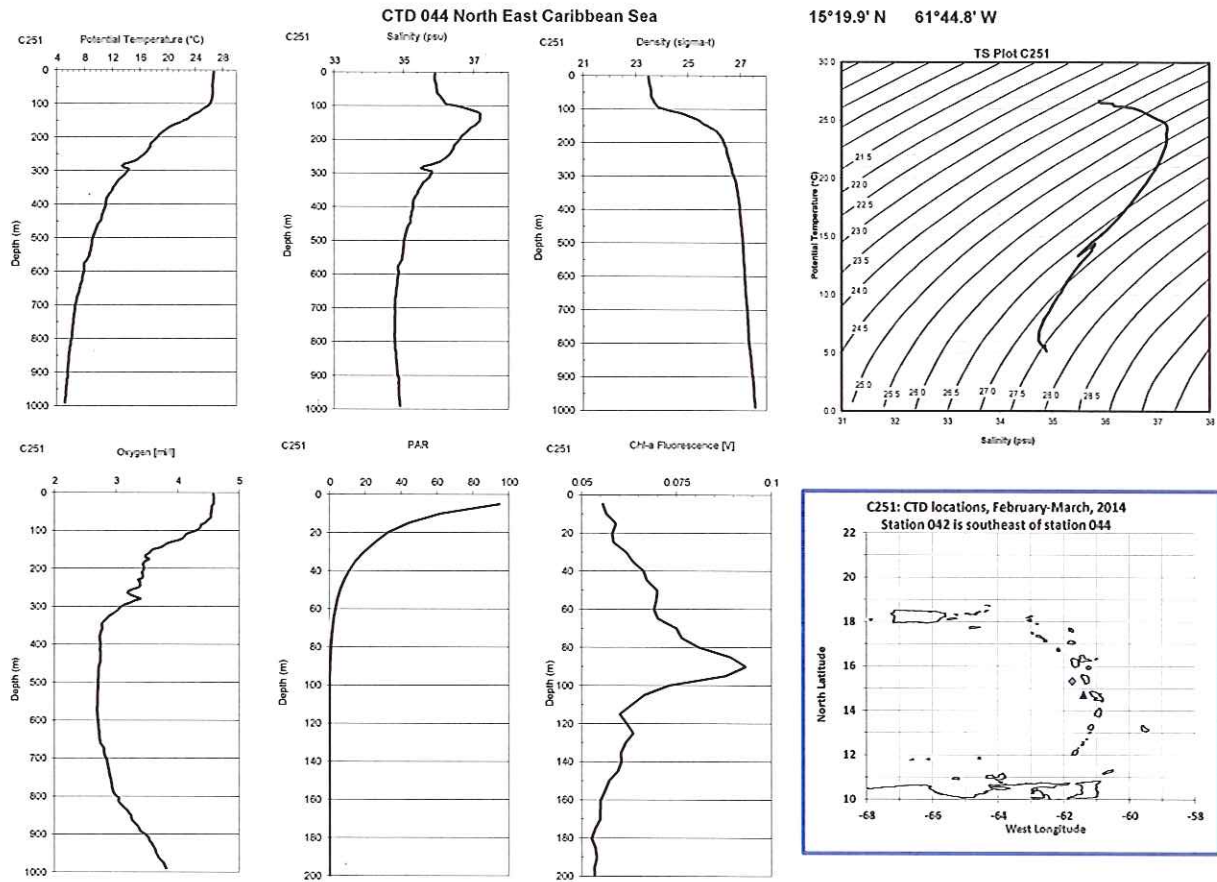
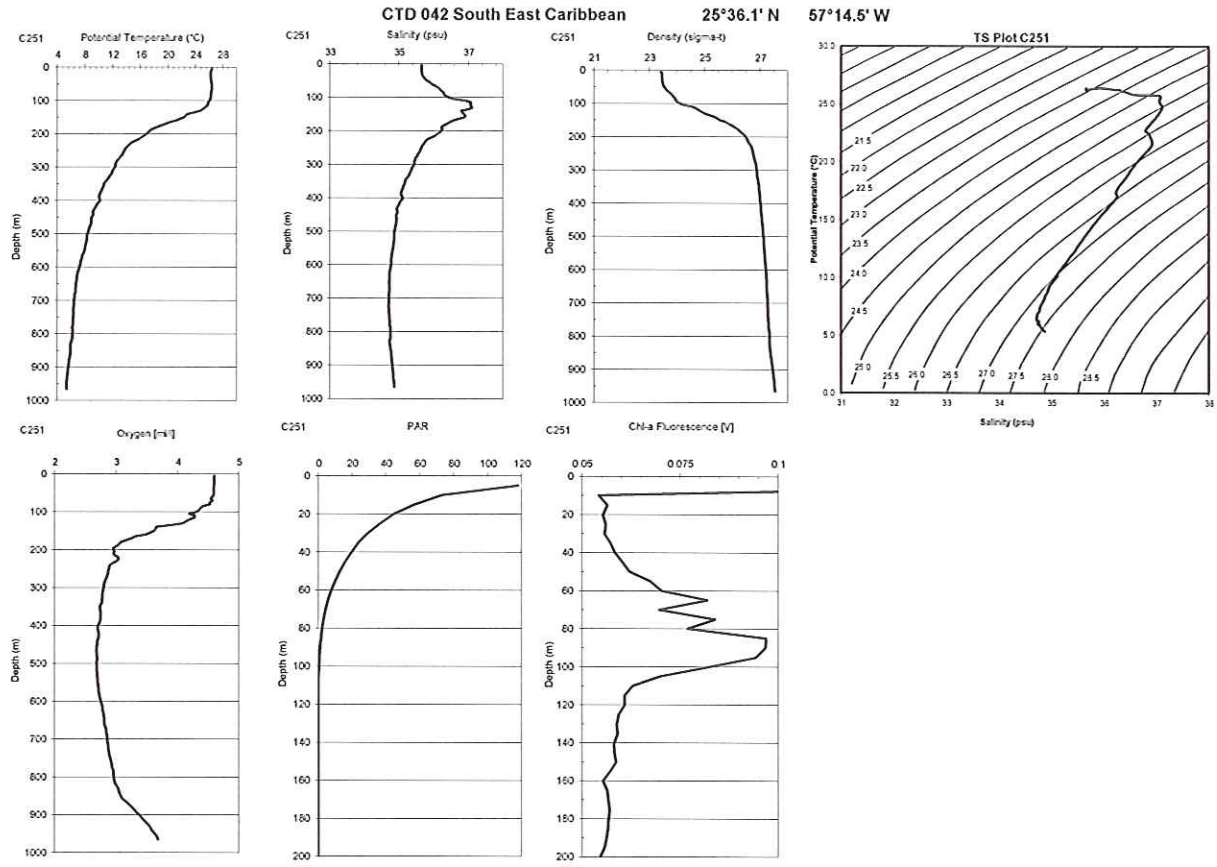
APPENDIX F. C251 CTD STATION PROFILES



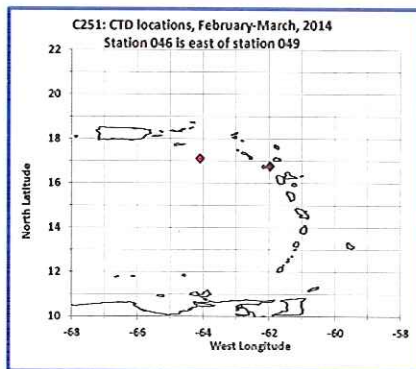
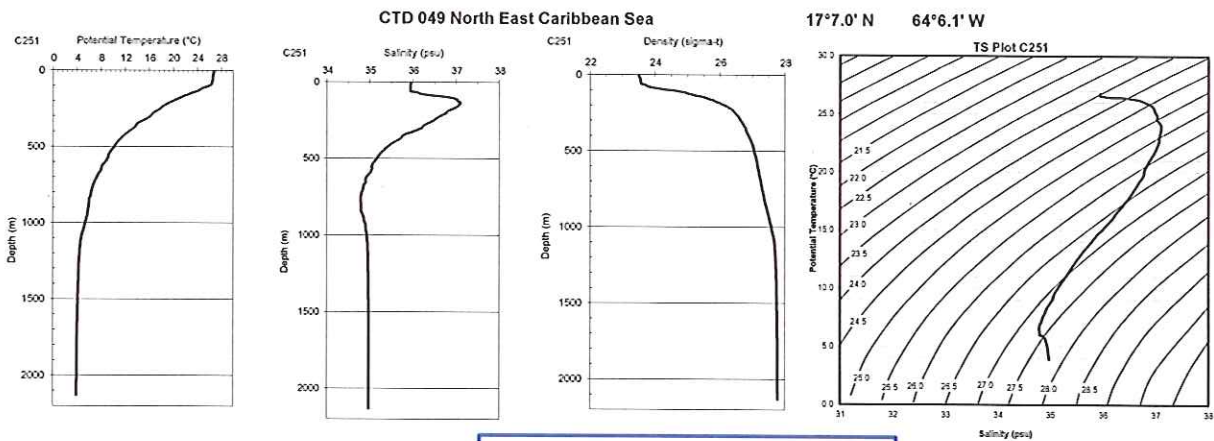
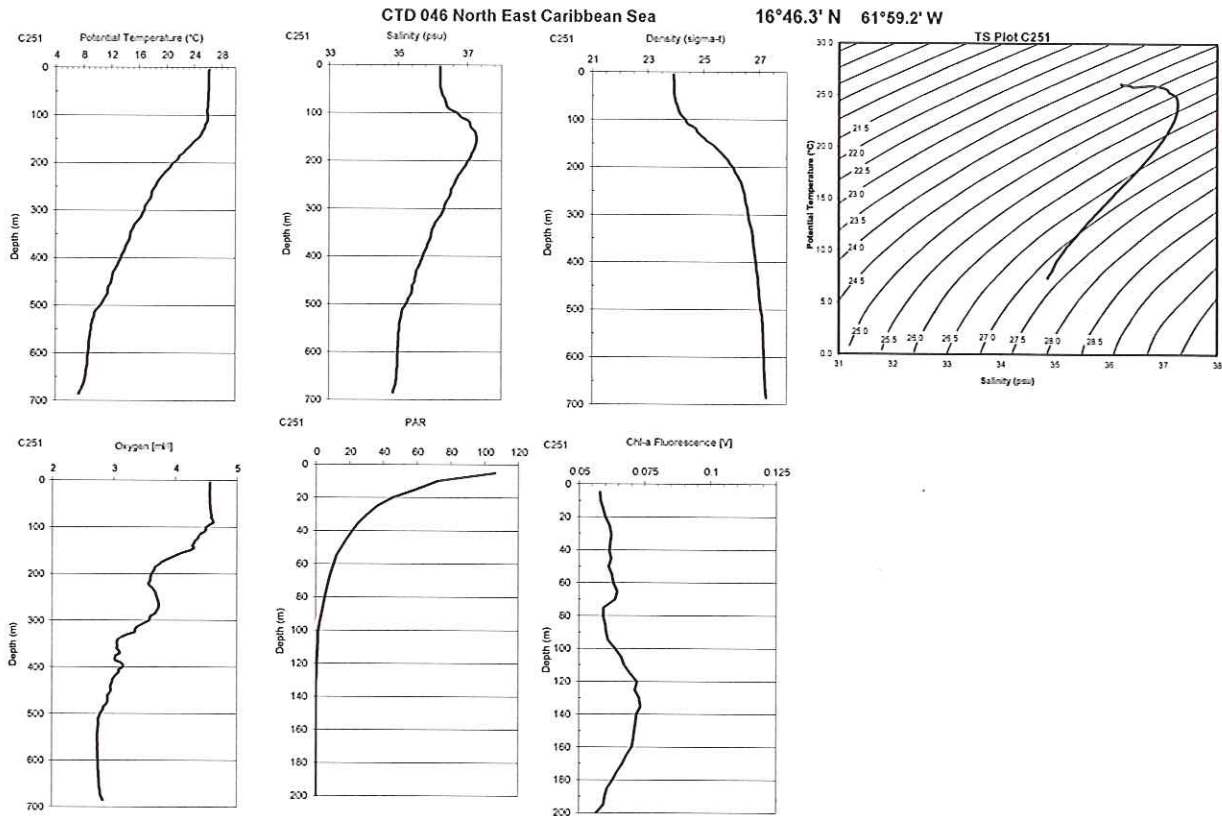
APPENDIX F. C251 CTD STATION PROFILES



APPENDIX F. C251 CTD STATION PROFILES



APPENDIX F. C251 CTD STATION PROFILES



APPENDIX F
 CZSI NET COLLECTIONS
 NEUSTON DATA SUMMARY

STATION	DATE	TIME	LOG	LAT.	LONG.	GENERAL LOCATE	SURF. TEMP.	SURF. SAL.	TOW DIST.	ZOOP-V OL	ZOOP-BI O-MASS	PLASTIC	TAR	SARGASSUM	PHYLLLO-SOMA	LEPTO-CEPHALI	HALLO-BATES
		(local)	(mm)	(°N)	(°W)		(°C)	(PSU)	(m)	(m)	ml/100m	(pieces)	(µg)	natans (g)	fuftans (g)		
CZS1	2014																
001	16-Feb-14	0025	45.0	19°20.7' N	66°5.1' W	Transition Zone	26.5	35.74	1129.1	2354.7	9.0	0.3822	0	0	0	0	2
002	16-Feb-14	1142	75.0	19°46.6' N	65°58.2' W	Transition Zone	26.3	35.80	985.8	1887.9	2.0	0.1059	0	0	0	0	3
003	17-Feb-14	0000	120.2	20°35.7' N	65°48.6' W	Transition Zone	25.8	36.20	985.0	1258.4	7.0	0.5563	0	0	0	0	0
004	17-Feb-14	1139	148.5	21°7.9' N	65°49.9' W	Transition Zone	26.1	35.90	992.6	1733.5	2.0	0.1154	0	0	0	0	0
005	18-Feb-14	0009	203.0	20°19.8' N	65°19.7' W	Transition Zone	25.8	36.15	944.7	2102.9	4.0	0.1902	0	0	0	0	0
006	18-Feb-14	1132	239.8	19°44.4' N	65°13.0' W	Transition Zone	26.1	35.90	947.7	1714.9	1.5	0.0875	0	0	0	0	1
007	19-Feb-14	0010	277.2	19°7.7' N	64°57.8' W	Transition Zone	26.2	35.95	1033.4	2305.3	4.0	0.1735	0	0	0	0	22
008	19-Feb-14	1325	HB	18°22.5' N	64°36.3' W	Sir Francis Drake Channel	26.4	35.90	1309.9	1969.6	2.5	0.1269	0	0	0	0	6
009	20-Feb-14	0017	341.1	17°43.8' N	64°16.7' W	NE Caribbean	26.2	36.09	1215.4	2377.7	5.5	0.2313	0	0	0	0	5
010	20-Feb-14	1150	375.1	17°42.4' N	64°15.0' W	NE Caribbean	26.3	36.20	1664.5	1975.8	5.0	0.2531	0	0	0	0	0
011	20-Feb-14	2242	402.6	18°0.3' N	64°20.3' W	NE Caribbean	26.1	36.04	1248.0	2165.8	7.0	0.3232	0	0	0	0	2
012	21-Feb-14	1209	449.5	17°49.2' N	63°51.8' W	NE Caribbean	26.3	36.20	1324.3	2082.9	2.0	0.0960	0	0	0	0	0
013	22-Feb-14	0001	485.1	18°25.9' N	63°55.1' W	NE Caribbean	26.1	35.99	1489.4	2135.7	2.0	0.0936	0	0	0	0	0
014	22-Feb-14	1113	520.0	18°0.2' N	63°30.3' W	NE Caribbean	26.4	36.25	1513.0	2031.5	2.5	0.1231	0	0	0	0	0
015	22-Feb-14	2352	559.9	18°5.9' N	63°22.9' W	NE Caribbean	26.1	36.20	1946.7	1520.3	5.0	0.3289	0	0	0	0	1
016	23-Feb-14	1159	599.1	17°59.6' N	63°16.2' W	NE Caribbean	26.4	36.31	1675.8	2155.4	2.0	0.0928	0	0	0	0	1
017	24-Feb-14	0013	645.0	17°23.8' N	62°58.9' W	NE Caribbean	26.5	36.02	756.7	1702.0	1.0	1.1163	0	0	0	0	0
018	24-Feb-14	1104	589.5	16°44.9' N	62°25.3' W	NE Caribbean	26.6	36.02	803.4	1627.2	1.5	0.0822	0	0	0	0	0
019	25-Feb-14	0016	742.2	16°33.6' N	61°58.7' W	NE Caribbean	26.4	36.04	846.6	2166.2	1.15	0.5309	0	0	0	0	2
020	28-Feb-14	0020	815.7	16°36.9' N	61°49.0' W	NE Caribbean	26.3	36.26	847.2	2100.7	6.0	0.2856	0	0	0	0	0
021	29-Feb-14	1050	848.5	16°43.1' N	61°43.5' W	NE Caribbean	26.3	36.22	723.9	2244.4	0.5	0.0223	0	0	0	0	0
022	1-Mar-14	2351	897.7	16°55.9' N	61°40.1' W	NE Caribbean	26.2	36.16	777.5	2871.0	6.0	0.2090	0	0	0	0	0
023	1-Mar-14	1155	947.8	16°30.5' N	61°6.7' W	NE Caribbean	26.3	36.08	744.9	1803.3	2.0	0.1109	0	0	0	0	1
024	2-Mar-14	0002	978.2	16°54.6' N	60°59.3' W	NE Caribbean	26.1	36.41	730.6	1732.8	9.0	0.5194	0	0	0	0	1
025	2-Mar-14	1058	1012.9	16°21.5' N	60°43.9' W	Transition Zone	26.3	36.32	690.0	1272.1	1.5	0.1179	0	0	0	0	1
026	3-Mar-14	0008	1055.2	15°35.8' N	60°46.4' W	Transition Zone	26.7	35.94	1030.8	1640.6	1.80	1.0972	0	0	0	0	1
028	4-Mar-14	1201	1095.7	15°0.2' N	60°27.0' W	Tropical Water	27.0	35.99	724.6	2778.0	2.0	0.0720	0	0	0	0	1
029	4-Mar-14	0008	1132.6	14°35.5' N	60°24.8' W	Tropical Water	26.9	35.99	826.7	2400.9	1.40	0.5831	0	0	0	0	5
030	4-Mar-14	1106	1166.0	14°1.9' N	60°22.9' W	Tropical Water	26.6	35.81	762.6	1894.3	3.0	0.1584	0	0	0	0	1
031	5-Mar-14	0000	1121.9	13°9.4' N	60°24.5' W	Tropical Water	26.7	35.92	915.0	1850.3	3.0	2.0537	0	0	0	0	1
032	5-Mar-14	1114	1251.2	12°28.3' N	60°30.6' W	Tropical Water	26.5	35.70	863.2	2190.9	2.0	0.0913	0	0	0	0	2
033	5-Mar-14	1114	1301.3	11°44.5' N	60°38.4' W	Tropical Water	27.0	35.61	1024.4	2407.6	139.0	5.7734	0	0	0	0	2
034	6-Mar-14	0013	1341.9	12°4.6' N	61°2.0' W	Tropical Water	26.8	35.46	803.1	1481.6	7.0	0.4725	0	0	0	0	0
035	6-Mar-14	1114	1341.9	12°4.6' N	61°2.0' W	Tropical Water	26.8	35.53	1190.8	1397.8	3.20	2.3920	0	0	0	0	0
036	7-Mar-14	0006	1397.9	13°9.7' N	61°20.4' W	SE Caribbean	26.7	35.45	1546.5	1592.1	2.40	1.5074	0	0	0	0	2
037	9-Mar-14	2359	1452.4	13°9.7' N	61°20.4' W	SE Caribbean	26.8	35.37	722.6	1852.0	3.0	0.162	0	0	0	0	2
038	13-Mar-14	1202	1519.1	13°38.6' N	61°24.7' W	SE Caribbean	26.7	35.45	1546.5	1592.1	2.40	1.5074	0	0	0	0	2
039	14-Mar-14	0003	1559.7	13°56.9' N	61°23.3' W	SE Caribbean	26.6	35.00	753.0	1852.0	10.5	0.567	0	0	0	0	2
041	14-Mar-14	2357	1635.0	14°35.1' N	61°20.3' W	SE Caribbean	26.3	35.60	771.0	1093.8	7.0	0.914	0	0	0	0	2
043	16-Mar-14	0003	1650.2	15°2.1' N	61°30.9' W	NE Caribbean	26.5	35.93	716.9	2181.6	7.0	0.321	0	0	0	0	0
044	16-Mar-14	1037	HB	15°20.2' N	61°45.7' W	NE Caribbean	27.0	35.95	672.3	547.9	15.0	2.739	0	0	0	0	0
045	17-Mar-14	0012	1713.5	16°8.3' N	61°57.2' W	NE Caribbean	26.6	35.96	772.3	1596.9	12.0	0.751	0	0	0	0	8
047	18-Mar-14	0004	1805.1	16°57.2' N	62°5.0' W	NE Caribbean	26.3	36.33	805.2	1772.7	6.0	0.338	0	0	0	0	0
050	20-Mar-14	2353	1951.5	17°26.5' N	64°12.6' W	NE Caribbean	26.8	36.00	1031.8	1746.8	8.0	0.458	0	0	0	0	7

APPENDIX F (cont.) C251 NET COLLECTIONS
C251 METER NET AND 2-METER NET COLLECTIONS

STATION	DATE	TIME	LOG (NM)	LAT. (°N)	LONG. (°W)	GENERAL LOCALE	NET TYPE	TOW TYPE	MESH SIZE (µ)	DEPTH (m)	TOW VOL. (m ³)	ZOOP. VOL. (ml)	LOOP. VOL. (ml/100m ³)	DENS Target Organism
C251-		(local)												
002A	16-Feb-14	1002	75.0	19°47.6' N	65°56.2' W	Transition Zone	Meter net	Vertical tow	200	50	127.7	-	-	Trichodesmium
002B	16-Feb-14	1009	75.0	19°47.5' N	65°56.3' W	Transition Zone	Meter net	Vertical tow	200	50	261.4	-	-	pteropods
004	17-Feb-14	0958	148.5	21°8.4' N	65°48.3' W	Transition Zone	Meter net	Vertical tow	200	50	99.0	-	-	Trichodesmium
006A	18-Feb-14	0948	238.8	19°45.6' N	65°10.8' W	Transition Zone	Meter net	Vertical tow	200	50	135.1	-	-	Trichodesmium
006B	18-Feb-14	0957	238.8	19°45.5' N	65°11.0' W	Transition Zone	Meter net	Vertical tow	200	50	294.9	-	-	pteropods
010	20-Feb-14	1007	375.0	17°44.0' N	64°13.6' W	NE Caribbean	Meter net	Vertical tow	200	50	163.6	-	-	Trichodesmium
011	20-Feb-14	2132	HB	18°2.5' N	64°19.2' W	NE Caribbean	Meter net	Vertical tow	200	50	439.6	-	-	pteropods
011-2MN	20-Feb-14	2157	HB	18°1.8' N	64°19.6' W	NE Caribbean	2 meter net	Stepped Oblique	1000	75-0	4230.5	-	-	Phyllisoema, Leptocephall
014	22-Feb-14	0940	520.0	18°0.9' N	63°28.4' W	NE Caribbean	Meter net	Vertical tow	200	50	1022.8	-	-	Trichodesmium
018	24-Feb-14	0938	689.2	16°45.9' N	62°24.3' W	NE Caribbean	Meter net	Vertical tow	200	50	108.1	-	-	Trichodesmium
021	28-Feb-14	0932	HB	16°43.9' N	61°44.4' W	NE Caribbean	Meter net	Vertical tow	200	50	110.4	-	-	Trichodesmium
025	2-Mar-14	0938	1012.9	16°21.8' N	60°42.7' W	Transition Zone	Meter net	Vertical tow	200	50	94.8	-	-	Trichodesmium
027	3-Mar-14	0940	HB	15°3.4' N	60°27.7' W	Tropics	Meter net	Vertical tow	200	50	110.9	-	-	Trichodesmium
030	4-Mar-14	0924	1166.0	14°1.9' N	60°20.4' W	Tropics	Meter net	Vertical tow	200	50	113.2	-	-	Trichodesmium
032A	5-Mar-14	0938	1251.0	12°28.1' N	60°28.0' W	Tropics	Meter net	Vertical tow	200	50	109.5	-	-	Trichodesmium
032B	5-Mar-14	0945	1251.0	12°28.1' N	60°28.2' W	Tropics	Meter net	Vertical tow	200	50	106.5	-	-	pteropods
033	5-Mar-14	2026	1289.7	11°54.0' N	60°34.8' W	Tropics	Meter net	Vertical tow	200	50	188.3	-	-	pteropods
033-2MN	5-Mar-14	2050	HB	11°54.0' N	60°35.6' W	Tropics	2 meter net	Stepped Oblique	1000	75-0	3182.6	710	3.36	Phyllisoema, Leptocephall
035	6-Mar-14	0938	HB	12°5.1' N	60°58.1' W	Tropics	Meter net	Vertical tow	200	50	113.9	-	-	Trichodesmium

C251 PHYTOPLANKTON NET COLLECTIONS

STATION	DATE	TIME	LOG (NM)	LAT. (°N)	LONG. (°W)	GENERAL LOCALE	TOW TYPE	DEPTH (m)	SURF TEMP (°C)	SURF SALINITY (PSU)	CHLOR. In situ fluor. (volts)
004	17-Feb-14	0950	148.9	21°8.4' N	65°48.1' W	Transition Zone	Vertical	0-50	26.0	35.98	984.8
010	20-Feb-14	0956	HB	17°44.2' N	64°13.7' W	NE Caribbean	Vertical	0-50	26.3	36.21	1190.8
030	4-Mar-14	0932	1166.0	14°1.8' N	60°20.6' W	Tropical Water	Vertical	0-50	26.5	35.80	780.5
035	6-Mar-14	0944	HB	12°5.1' N	60°58.5' W	Tropical Water	Vertical	0-50	27.0	35.36	876.4

APPENDIX G.
C-251 SHIPEK GRAB STATIONS.

STATION #	DATE	TIME	LAT. (°N)	LONG. (°W)	DEPTH (m)	GENERAL LOCALE	DESCRIPTION
C251		(local)					
048	18-Mar-14	1034	16°48.1'	62°12.6'	24	NE Caribbean- Little Bay, Montserrat	Color: 5Y 4/1 Olive gray Sand-Silt/granular Rounded turtle grass crab, brittle stars present