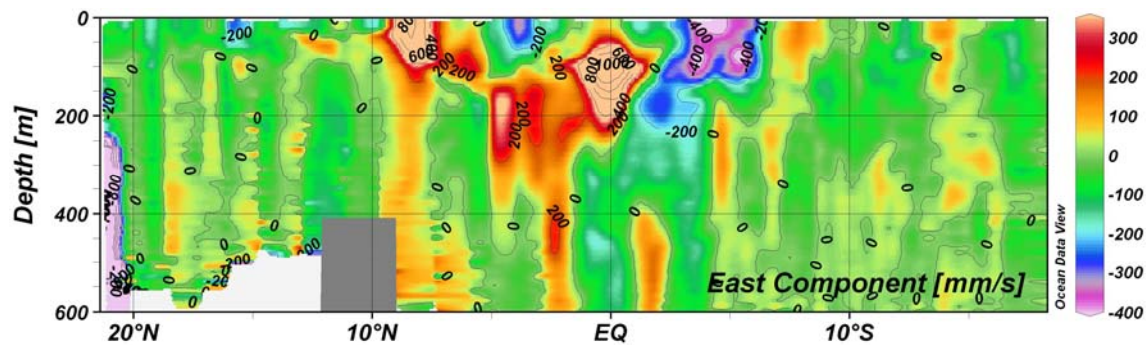


Cruise Report S-196

Scientific data collected aboard
SSV Robert C. Seamans

Puerto Vallarta, Mexico – Hiva Oa, Marquesas –
Papeete, Tahiti

28 November 2004 – 9 January 2005



Sea Education Association
Woods Hole, Massachusetts



To obtain unpublished data, contact the SEA data archivist:

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Ship's Company, SSV Robert C. Seamans, Cruise S-196

Nautical Staff

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Data Description

This cruise report provides a record of data collected during S-196 aboard the SSV *Robert C. Seamans* (U.S. State Department Cruise 2004-053) on her voyage from Puerto Vallarta, Mexico to Papeete, Tahiti (Figure 1). We collected samples or data at 89 discrete oceanographic stations (Table 1) in addition to continuously sampling water depth, sub-bottom profiles, Acoustic Doppler Current Profiles (ADCP), and flow-through sea

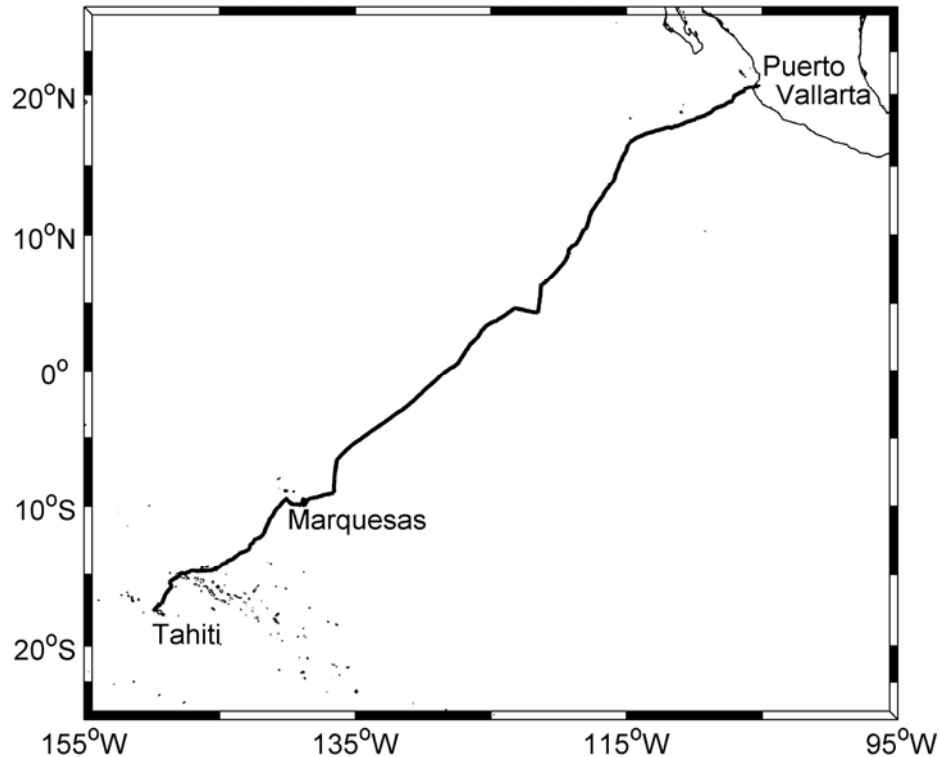


Figure 1: S-196 cruise track.

surface temperature, salinity and *in vivo* fluorescence. This report summarizes sea surface chemical and biological characteristics (Tables 2-4), subsurface biological samples (Tables 4 and 5), and chemical properties with depth (Table 6). Summary contour plots of temperature, salinity, and *in-vivo* fluorescence show large-scale hydrography of the eastern and central tropical Pacific (Figure 2). ADCP data show locations and intensities of the primary tropical Pacific currents under mild El Niño conditions, and the strength and depth of zooplankton vertical migration (Figure 3). Lengthy CTD, CHIRP, ADCP, and flow-through data are not reported here. All unpublished data can be made available by arrangement with the Sea Education Association (SEA) archivist (contact information,

p.2). The information in this report is not intended to represent final interpretation of the data and should not be excerpted or cited without written permission from SEA.

As part of SEA's educational program, undergraduates conduct student-designed oceanographic research during the cruise. Project topics include physical, chemical, biological and geological oceanography (Table 7). Student research efforts culminate in a written paper and oral presentation to the ship's company. These papers are available on request from SEA.

Sara Harris
Chief Scientist
S-196

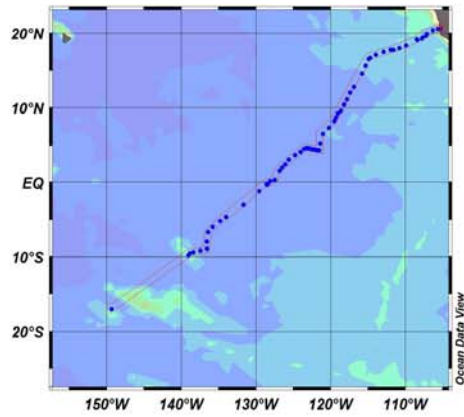
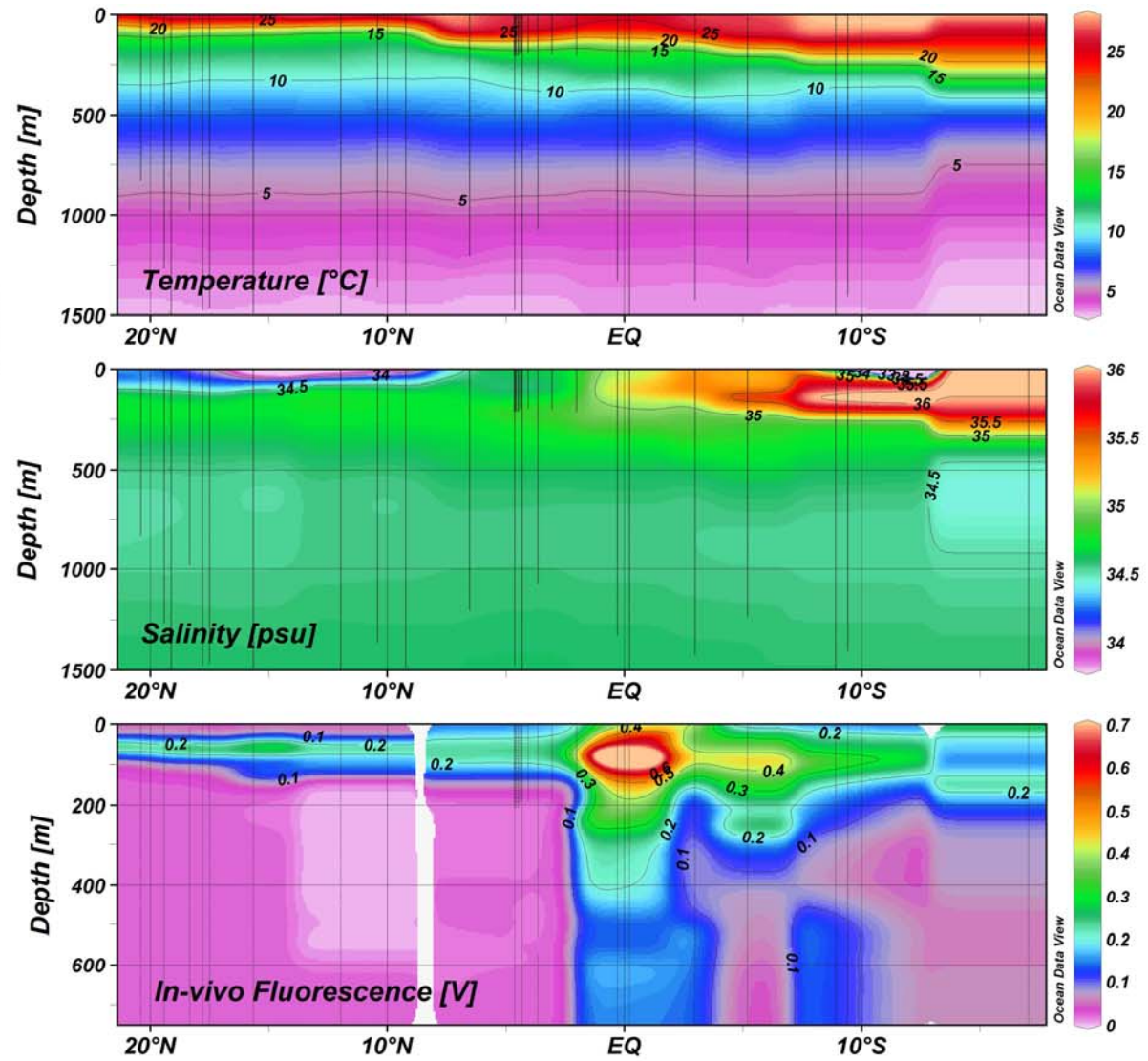


Figure 2: Temperature, salinity, and *in vivo* fluorescence cross-sections from cruise S-196. Electronic data are available on request.



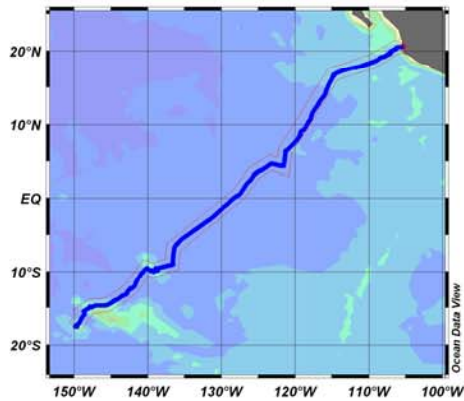


Figure 3: Acoustic Doppler Current Profiler cross-sections from cruise S-196. Top panel shows strong northerly (red) current near the equator in the upper 150 m of the water column. Middle panel shows strong easterly (red) North Equatorial Counter Current (NECC), Equatorial Undercurrent (EUC) and off axis counter current jet north of the equator. The westerly (purple) South Equatorial Current (SEC) is divided into two branches, north and south of the equator. Bottom panel shows changing depth and intensity of zooplankton diel vertical migration. Electronic data are available on request.

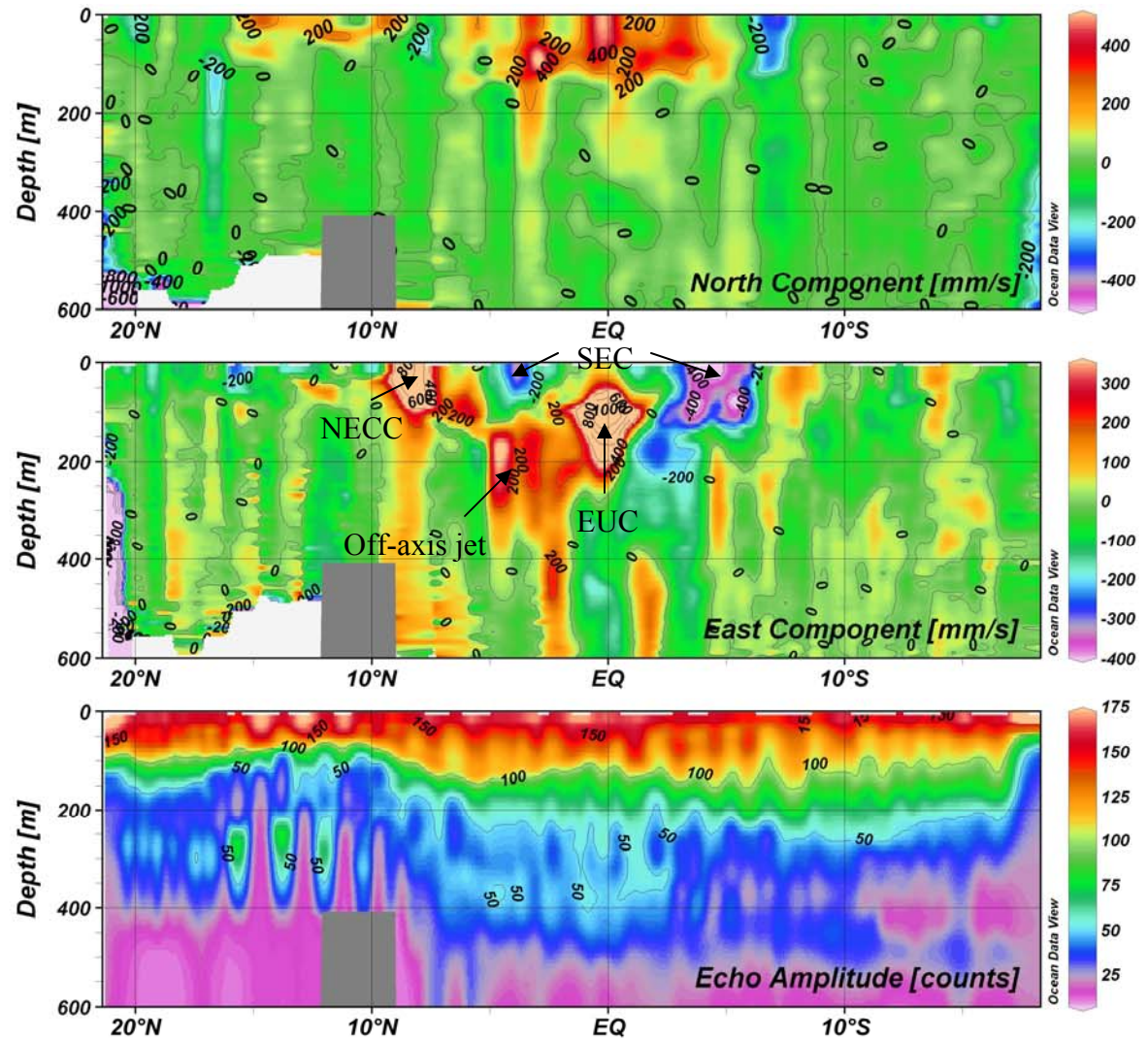


Table 1: Oceanographic sampling stations.

Station #	Date	Local Time	Log (nm)	Latitude	Longitude	Cast Depth (m)	General Locale
CTD							
S196-002-CTD	30-Nov-04	1049	64.3	20°24.0' N	106°19.1' W	850	Eastern Pacific
S196-006-CTD	1-Dec-04	2057	219.8	19°25.2' N	107°39.4' W	1266	Eastern Pacific
S196-008-CTD	2-Dec-04	0946	264.8	19°6.7' N	108°24.4' W	1676	Eastern Pacific
S196-011-CTD	3-Dec-04	1105	373.2	18°20.4' N	109°54.4' W	980	Eastern Pacific
S196-014-CTD	4-Dec-04	1050	478.6	17°47.3' N	111°34.7' W	1488	Eastern Pacific
S196-014-RBR	4-Dec-04	1050	478.6	17°47.3' N	111°34.7' W	493	Eastern Pacific
S196-017-CTD	5-Dec-04	1034	555.4	17°30.0' N	112°55.0' W	1478	Eastern Pacific
S196-022-CTD	7-Dec-04	1104	803.8	15°38.7' N	115°18.8' W	1488	Eastern Pacific
S196-025-CTD	8-Dec-04	0945	934.0	13°46.7' N	116°6.3' W	1474	Eastern Pacific
S196-028-CTD	9-Dec-04	1051	1068.0	11°58.1' N	117°24.0' W	1545	Eastern Pacific
S196-031-CTD	10-Dec-04	1032	1172.7	10°24.5' N	118°10.6' W	1365	Eastern Pacific
S196-034-CTD	11-Dec-04	1020	1256.7	9°12.1' N	119°1.9' W	1488	Tropical Pacific
S196-034-RBR	11-Dec-04	1020	1256.7	9°12.1' N	119°1.9' W	390	Tropical Pacific
S196-039-CTD	13-Dec-04	0950	1485.0	6°32.0' N	121°1.5' W	1199	Tropical Pacific
S196-042-CTD	14-Dec-04	0957	1632.7	4°18.7' N	121°33.8' W	1551	Tropical Pacific
S196-044-CTD	14-Dec-04	1343	1638.8	4°20.3' N	121°41.8' W	183	Tropical Pacific
S196-045-CTD	14-Dec-04	1648	1651.5	4°22.1' N	121°57.2' W	192	Tropical Pacific
S196-046-CTD	14-Dec-04	1939	1661.7	4°27.7' N	122°11.2' W	196	Tropical Pacific
S196-047-CTD	15-Dec-04	0003	1675.3	4°28.2' N	122°29.8' W	206	Tropical Pacific
S196-049-CTD	15-Dec-04	0510	1684.8	4°32.8' N	122°43.1' W	206	Tropical Pacific
S196-050-CTD	15-Dec-04	0745	1702.1	4°35.7' N	122°59.0' W	199	Tropical Pacific
S196-051-CTD	15-Dec-04	1038	1711.0	4°37.4' N	123°8.4' W	1474	Tropical Pacific
S196-053-CTD	15-Dec-04	1400	1717.3	4°38.8' N	123°15.4' W	206	Tropical Pacific
S196-054-CTD	15-Dec-04	0130	1773.0	4°3.4' N	124°2.2' W	191	Tropical Pacific
S196-056-CTD	16-Dec-04	1020	1817.5	3°38.9' N	124°43.8' W	1069	Tropical Pacific
S196-058-CTD	17-Dec-04	0047	1805.8	3°3.0' N	125°36.4' W	196	Tropical Pacific
S196-060-CTD	17-Dec-04	0912	1936.5	2°25.3' N	126°3.1' W	1388	Tropical Pacific
S196-062-CTD	17-Dec-04	1715	1928.3	2°1.1' N	126°31.0' W	207	Equatorial Pacific
S196-064-CTD	18-Dec-04	1840	2109.9	0°16.0' N	127°50.3' W	1332	Equatorial Pacific
S196-066-CTD	19-Dec-04	0944	2172.5	0°12.5' S	128°35.6' W	1612	Equatorial Pacific
S196-069-CTD	21-Dec-04	2307	2424.7	2°58.6' S	131°38.7' W	1424	Equatorial Pacific
S196-072-CTD	22-Dec-04	1020	2639.8	5°11.6' S	134°47.6' W	1231	Equatorial Pacific
S196-077-CTD	24-Dec-04	0946	2878.0	8°54.7' S	136°35.0' W	2098	Equatorial Pacific
S196-079-CTD	25-Dec-04	1040	3004.6	9°25.6' S	138°22.6' W	1404	Tropical Pacific
S196-088-CTD	6-Jan-05	0558	3934.5	17°2.7' S	149°19.9' W	1611	South Tropical Pacific
Hydrocast							
S196-002-HC	30-Nov-04	1049	64.3	20°24.0' N	106°19.1' W	850	Eastern Pacific
S196-008-HC	2-Dec-04	0946	264.8	19°6.7' N	108°24.4' W	1676	Eastern Pacific
S196-011-HC	3-Dec-04	1105	373.2	18°20.4' N	109°54.4' W	980	Eastern Pacific
S196-025-HC	8-Dec-04	0945	934.0	13°46.7' N	116°6.3' W	1474	Eastern Pacific
S196-039-HC	13-Dec-04	0950	1485.0	6°32.0' N	121°1.5' W	1199	Tropical Pacific
S196-042-HC	14-Dec-04	0957	1632.7	4°18.7' N	121°33.8' W	1551	Tropical Pacific
S196-064-HC	18-Dec-04	1840	2109.9	0°16.0' N	127°50.3' W	1332	Equatorial Pacific
S196-066-HC	19-Dec-04	0944	2172.5	0°12.5' S	128°35.6' W	1612	Equatorial Pacific
S196-072-HC	22-Dec-04	1020	2639.8	5°11.6' S	134°47.6' W	1231	Equatorial Pacific

Table 1 continued

Station #	Date	Local Time	Log (nm)	Latitude	Longitude	Cast Depth (m)	General Locale
Neuston Net							
S196-001-NT	30-Nov-04	0205	23.5	20°43.2' N	105°40.0' W	0	Near Puerto Vallarta
S196-003-NT	30-Nov-04	1222	64.7	20°21.3' N	106°18.5' W	0	Eastern Pacific
S196-005-NT	1-Dec-04	1237	190.3	19°38.5' N	107°11.6' W	0	Eastern Pacific
S196-007-NT	2-Dec-04	0041	228.2	19°18.3' N	107°47.2' W	0	Eastern Pacific
S196-009-NT	2-Dec-04	1147	264.4	19°5.5' N	108°24.4' W	0	Eastern Pacific
S196-010-NT	3-Dec-04	0028	322.3	18°36.2' N	109°10.5' W	0	Eastern Pacific
S196-012-NT	3-Dec-04	1234	373.5	18°14.4' N	109°54.8' W	0	Eastern Pacific
S196-013-NT	4-Dec-04	0024	427.9	18°1.8' N	110°46.4' W	0	Eastern Pacific
S196-015-NT	4-Dec-04	1227	478.6	17°46.2' N	111°34.9' W	0	Eastern Pacific
S196-016-NT	5-Dec-04	0033	494.1	17°45.2' N	111°56.9' W	0	Eastern Pacific
S196-018-NT	5-Dec-04	1152	554.0	17°29.0' N	112°55.5' W	0	Eastern Pacific
S196-019-NT	6-Dec-04	0000	615.0	17°7.8' N	113°58.0' W	0	Eastern Pacific
S196-020-NT	6-Dec-04	0857	666.5	16°43.7' N	114°41.9' W	0	Eastern Pacific
S196-021-NT	6-Dec-04	2300	746.6	16°34.4' N	114°52.8' W	0	Eastern Pacific
S196-023-NT	7-Dec-04	1213	803.8	15°37.6' N	115°18.0' W	0	Eastern Pacific
S196-024-NT	8-Dec-04	0042	878.3	14°35.2' N	115°47.6' W	0	Eastern Pacific
S196-026-NT	8-Dec-04	1146	934.3	13°45.7' N	116°8.6' W	0	Eastern Pacific
S196-027-NT	9-Dec-04	0123	1015.7	12°41.2' N	116°53.7' W	0	Eastern Pacific
S196-029-NT	9-Dec-04	1207	1068.0	11°57.8' N	117°24.0' W	0	Eastern Pacific
S196-030-NT	10-Dec-04	0017	1127.6	11°3.4' N	117°48.8' W	0	Eastern Pacific
S196-032-NT	10-Dec-04	1204	1172.8	10°23.0' N	118°11.7' W	0	Eastern Pacific
S196-033-NT	11-Dec-04	0029	1222.0	9°34.8' N	118°36.8' W	0	Eastern Pacific
S196-035-NT	11-Dec-04	1144	1256.7	9°13.4' N	119°2.0' W	0	Tropical Pacific
S196-036-NT	12-Dec-04	0024	1293.0	8°43.7' N	119°16.6' W	0	Tropical Pacific
S196-037-NT	12-Dec-04	1148	1335.3	8°13.7' N	119°30.3' W	0	Tropical Pacific
S196-038-NT	13-Dec-04	0018	1403.6	7°30.4' N	120°4.2' W	0	Tropical Pacific
S196-040-NT	13-Dec-04	1125	1485.0	6°31.5' N	121°2.5' W	0	Tropical Pacific
S196-041-NT	14-Dec-04	0025	1561.2	5°24.7' N	121°23.9' W	0	Tropical Pacific
S196-043-NT	14-Dec-04	1149	1634.4	4°19.7' N	121°34.7' W	0	Tropical Pacific
S196-048-NT	15-Dec-04	0025	1675.5	4°28.9' N	122°29.8' W	0	Tropical Pacific
S196-052-NT	15-Dec-04	1154	1711.0	4°38.2' N	123°9.3' W	0	Tropical Pacific
S196-055-NT	16-Dec-04	0152	1773.1	4°4.2' N	124°3.3' W	0	Tropical Pacific
S196-057-NT	16-Dec-04	1136	1817.6	3°30.4' N	124°46.2' W	0	Tropical Pacific
S196-059-NT	17-Dec-04	0125	1886.3	3°3.2' N	125°37.3' W	0	Tropical Pacific
S196-061-NT	17-Dec-04	1025	1936.5	2°25.2' N	126°4.8' W	0	Tropical Pacific
S196-063-NT	18-Dec-04	2356	2003.1	1°33.2' N	126°47.6' W	0	Equatorial Pacific
S196-065-NT	19-Dec-04	0029	2128.5	0°10.8' N	128°5.4' W	0	Equatorial Pacific
S196-067-NT	19-Dec-04	1132	2173.0	0°13.0' S	128°36.5' W	0	Equatorial Pacific
S196-068-NT	20-Dec-04	0004	2252.5	1°6.8' S	129°33.8' W	0	Equatorial Pacific
S196-070-NT	21-Dec-04	0022	2425.0	2°58.4' S	131°40.6' W	0	Equatorial Pacific
S196-071-NT	22-Dec-04	0005	2586.0	4°36.4' S	134°0.2' W	0	Equatorial Pacific
S196-073-NT	22-Dec-04	1159	2640.0	5°11.7' S	134°49.4' W	0	Equatorial Pacific
S196-074-NT	23-Dec-04	0037	2704.9	5°59.1' S	135°47.2' W	0	Tropical Pacific
S196-075-NT	23-Dec-04	1133	2754.9	6°42.6' S	136°23.8' W	0	Tropical Pacific
S196-076-NT	24-Dec-04	0010	2821.3	7°58.8' S	136°35.5' W	0	Tropical Pacific
S196-078-NT	25-Dec-04	0004	2942.0	9°11.6' S	137°25.8' W	0	Tropical Pacific

Table 1 continued

Station #	Date	Local Time	Log (nm)	Latitude	Longitude	Cast Depth (m)	General Locale
Neuston Net continued							
S196-080-NT	25-Dec-04	1158	3004.6	9°25.6' S	138°22.6' W	0	Tropical Pacific
S196-081-NT	26-Dec-04	0018	3055.8	9°35.3' S	138°52.4' W	0	Tropical Pacific
S196-083-NT	31-Dec-04	0038	3134.2	9°50.7' S	139°34.6' W	0	Tropical Pacific
S196-084-NT	31-Dec-04	0600	3152.0	9°47.2' S	139°32.3' W	0	Tropical Pacific
S196-086-NT	6-Jan-05	1235	3863.1	15°49.0' S	148°34.4' W	0	Tropical Pacific
S196-087-NT	6-Jan-05	2352	3912.3	16°39.7' S	149°8.1' W	0	Tropical Pacific
S196-089-NT	7-Jan-05	0927	3935.0	17°4.1' S	149°23.7' W	0	Tropical Pacific
Meter Net							
S196-001-MN	30-Nov-04	0210	23.5	20°34.2' N	105°40.0' W	0	Off Puerto Vallarta Hai
S196-004-MN	30-Nov-04	2215	122.3	19°54.6' N	107°5.1' W	0	Eastern Pacific
S196-007-MN	2-Dec-04	0047	228.3	19°18.9' N	107°47.0' W	0	Eastern Pacific
S196-010-MN	3-Dec-04	0032	322.3	18°36.2' N	109°10.5' W	0	Eastern Pacific
S196-013-MN	4-Dec-04	0026	428.0	18°1.8' N	110°46.4' W	0	Eastern Pacific
S196-016-MN	5-Dec-04	0034	494.1	17°45.2' N	111°56.9' W	0	Eastern Pacific
S196-019-MN	6-Dec-04	0003	615.1	17°7.8' N	113°58.1' W	0	Eastern Pacific
S196-024-MN	8-Dec-04	0052	878.6	14°35.0' N	115°47.4' W	0	Eastern Pacific
S196-027-MN	9-Dec-04	0123	1015.7	12°41.2' N	116°53.7' W	0	Eastern Pacific
S196-030-MN	10-Dec-04	0025	1127.6	11°3.4' N	117°48.8' W	0	Eastern Pacific
S196-033-MN	11-Dec-04	0032	1222.1	9°34.8' N	118°36.8' W	0	Eastern Pacific
S196-036-MN	12-Dec-04	0026	1293.7	8°43.9' N	119°16.8' W	0	Tropical Pacific
S196-038-MN	13-Dec-04	0023	1403.8	7°30.2' N	120°4.3' W	0	Tropical Pacific
S196-041-MN	14-Dec-04	0027	1561.2	5°24.7' N	121°23.9' W	0	Tropical Pacific
S196-048-MN	15-Dec-04	0028	1675.5	4°28.9' N	122°29.8' W	0	Tropical Pacific
S196-055-MN	16-Dec-04	0155	1773.1	4°4.2' N	124°3.3' W	0	Tropical Pacific
S196-059-MN	17-Dec-04	0113	1886.3	3°3.3' N	125°37.4' W	0	Tropical Pacific
S196-059-2MN	17-Dec-04	0113	1886.0	3°3.2' N	125°37.1' W	113	Tropical Pacific
S196-063-MN	18-Dec-04	0001	2003.1	1°33.2' N	126°49.0' W	0	Equatorial Pacific
S196-065-MN	19-Dec-04	0030	2128.5	0°10.7' N	128°5.4' W	0	Equatorial Pacific
S196-068-MN	20-Dec-04	0008	2252.6	1°6.8' S	129°33.8' W	0	Equatorial Pacific
S196-070-MN	21-Dec-04	0024	2425.0	2°58.4' S	131°40.6' W	0	Equatorial Pacific
S196-071-MN	22-Dec-04	0013	2586.1	4°36.4' S	134°0.2' W	0	Equatorial Pacific
S196-074-MN	23-Dec-04	0040	2705.0	5°59.1' S	135°47.2' W	0	Tropical Pacific
S196-076-MN	24-Dec-04	0012	2821.3	7°58.8' S	136°35.5' W	0	Tropical Pacific
S196-078-MN	25-Dec-04	0008	2942.0	9°11.6' S	137°25.8' W	0	Equatorial Pacific
S196-081-MN	26-Dec-04	0023	3055.8	9°35.3' S	138°52.4' W	0	South Tropical Pacific
S196-087-MN	6-Jan-05	2356	3912.3	16°39.7' S	149°8.1' W	0	South Tropical Pacific
Phytoplankton Net							
S196-046-PN	14-Dec-04	1939	1661.7	4°24.7' N	122°11.2' W	0	Tropical Pacific
S196-048-PN	15-Dec-04	0025	1675.5	4°28.9' N	122°29.8' W	0	Tropical Pacific
S196-050-PN	15-Dec-04	0745	1702.1	4°35.7' N	122°59.0' W	0	Tropical Pacific
S196-052-PN	15-Dec-04	1154	1711.0	4°38.2' N	123°9.3' W	0	Tropical Pacific

Table 1 continued

Station #	Date	Local Time	Log* (nm)	Latitude	Longitude	Cast Depth (m)	General Locale
Tucker Trawl							
S196-004-TT1	30-Nov-04	2145	122.0	19°55.0'	107°6.6'	300	Eastern Pacific
S196-005-TT1	1-Dec-04	1209	190.3	19°39.2'	107°12.4'	300	Eastern Pacific
S196-005-TT2	1-Dec-04	1305	191.7	19°39.2'	107°12.4'	100	Eastern Pacific
S196-005-TT3	1-Dec-04	1333	192.0	19°39.2'	107°12.4'	20	Eastern Pacific
S196-020-TT1	6-Dec-04	0830	665.9	16°44.7'	114°42.1'	300	Eastern Pacific
S196-020-TT2	6-Dec-04	0930	667.0	16°44.7'	114°42.1'	100	Eastern Pacific
S196-020-TT3	6-Dec-04	1005	667.8	16°44.7'	114°42.1'	20	Eastern Pacific
S196-021-TT1	6-Dec-04	2303	746.4	16°34.4'	114°52.8'	300	Eastern Pacific
S196-021-TT2	6-Dec-04	0003	746.8	16°34.4'	114°52.8'	100	Eastern Pacific
S196-021-TT3	6-Dec-04	0037	747.0	16°34.4'	114°52.8'	20	Eastern Pacific
S196-037-TT1	12-Dec-04	1009	1335.0	8°14.4'	119°32.0'	211	Tropical Pacific
S196-074-TT2	23-Dec-04	0003	2704.4	5°57.9'	135°46.6'	150	Tropical Pacific
S196-074-TT3	23-Dec-04	0003	2704.4	5°57.9'	135°46.6'	50	Tropical Pacific
S196-075-TT1	23-Dec-04	1056	2754.0	6°41.1'	136°24.0'	400	Tropical Pacific
S196-075-TT2	23-Dec-04	1232	2756.0	6°41.1'	136°24.0'	150	Tropical Pacific
S196-083-TT1	30-Dec-04	2356	3034.2	9°49.1'	139°33.9'	450	Tropical Pacific
S196-083-TT2	30-Dec-04	2356	3034.2	9°49.1'	139°33.9'	150	Tropical Pacific
S196-083-TT3	30-Dec-04	2356	3034.2	9°49.1'	139°33.9'	50	Tropical Pacific
S196-084-TT1	31-Dec-04	0524	3051.2	9°46.2'	139°42.2'	450	Tropical Pacific
S196-084-TT2	31-Dec-04	0658	3052.3	9°46.2'	139°42.2'	150	Tropical Pacific
S196-084-TT3	31-Dec-04	0719	3053.2	9°46.2'	139°42.2'	50	Tropical Pacific
Secchi Disk							
S196-002-SD	30-Nov-04	1049	64.3	22°24.0' N	106°19.1' W	29	Eastern Pacific
S196-011-SD	3-Dec-04	1105	373.3	18°20.4' N	109°54.4' W	29	Eastern Pacific
S196-039-SD	13-Dec-04	0940	1485.0	6°32.0' N	121°1.5' W	29	Eastern Pacific
S196-066-SD	19-Dec-04	0000	2172.5	0°12.5' S	128°35.6' W	21	Equatorial Pacific
S196-085-SD	2-Jan-05	1013		12°15.9' S	142°4.7' W	>22	South Tropical Pacific
Shipek Grab							
S196-082-SG	30-Dec-04	1109	3071.0	9°49.7' S	139°0.4' W	79	Marquesas

*Blank spaces mean no data collected

Table 2: Surface station data.

Station #	Date	Local Time	Log* (nm)	Latitude	Longitude	PO ₄ * (mM)	Chl a* (mg/l)
SS-001	29-Nov-04	1725		20°38.2' N	105°15.1' W	0.440	0.109
SS-002	30-Nov-04	0210	23.5	20°34.2' N	105°40.0' W	0.262	0.084
SS-003	30-Nov-04	1134	64.3	20°22.6' N	106°18.9' W		
SS-004	30-Nov-04	2205	122.3	19°54.9' N	107°6.2' W	0.297	0.044
SS-005	1-Dec-04	1220	190.3	19°39.2' N	107°12.4' W	0.196	0.018
SS-006	2-Dec-04	0110	228.8	19°17.4' N	107°46.3' W	0.211	0.016
SS-007	4-Dec-04	0053	428.8	18°1.8' N	110°46.4' W	0.414	0.041
SS-008	4-Dec-04	1227	478.6	17°46.0' N	111°34.8' W	0.582	0.024
SS-009	5-Dec-04	0055	494.1	17°45.3' N	111°57.2' W	0.969	
SS-010	5-Dec-04	1200	554.0	17°29.0' N	112°55.5' W	0.180	0.040
SS-011	6-Dec-04	0006	615.0	17°7.7' N	113°58.1' W	0.124	0.032
SS-012	6-Dec-04	0940	667.3	16°42.7' N	114°41.5' W	0.140	0.028
SS-013	6-Dec-04	2345	746.8	16°33.1' N	114°52.9' W	0.094	0.019
SS-014	7-Dec-04	1220	803.7	15°37.8' N	115°19.0' W	0.328	0.036
SS-015	8-Dec-04	0110	879.0	14°34.5' N	115°47.1' W	0.114	0.067
SS-016	9-Dec-04	0020	1013.8	12°42.7' N	116°51.6' W	0.145	0.047
SS-017	9-Dec-04	1207	1068.0	11°57.7' N	117°24.8' W	0.129	0.040
SS-018	10-Dec-04	0035	1127.9	11°3.2' N	117°48.8' W	0.135	0.033
SS-019	10-Dec-04	1206		10°22.6' N	118°11.7' W	0.145	0.031
SS-020	11-Dec-04	0035	1224.0	9°34.8' N	118°36.8' W	0.496	0.005
SS-021	11-Dec-04	1144	1256.7	9°13.4' N	119°2.0' W	0.129	0.019
SS-022	12-Dec-04	0032	1293.7	8°43.8' N	119°16.8' W	0.267	0.027
SS-023	12-Dec-04	1148	1335.3	8°13.2' N	119°30.1' W	0.175	0.023
SS-024	13-Dec-04	0120	1409.1	7°20.8' N	120°12.3' W	0.129	0.027
SS-025	14-Dec-04	0025	1561.2	5°14.7' N	121°24.1' W	0.399	0.016
SS-026	15-Dec-04	0035		4°29.0' N	122°30.0' W	0.404	0.041
SS-027	15-Dec-04	1154	1711.0	4°38.2' N	123°9.3' W		0.022
SS-028	15-Dec-04	0207	1773.0	4°30.2' N	123°33.8' W	0.384	0.029
SS-029	16-Dec-04	1103	1817.5	3°39.7' N	124°45.0' W	0.633	0.038
SS-030	17-Dec-04	0050	1885.8	3°3.0' N	125°36.4' W	0.623	0.051
SS-031	17-Dec-04	1045	1936.5	2°25.2' N	126°4.9' W		0.033
SS-032	18-Dec-04	0012	2003.1	1°33.1' N	126°50.0' W	0.954	0.004
SS-033	19-Dec-04	0045	2128.5	0°10.6' N	128°5.5' W	1.071	0.019
SS-034	20-Dec-04	0013	2252.5	1°6.8' S	129°33.8' W	0.654	0.078
SS-035	21-Dec-04	0024	2425.0	2°58.4' S	131°40.5' W	0.557	0.017
SS-036	22-Dec-04	0011	2586.0	4°35.9' S	133°59.9' W	0.485	0.009
SS-037	23-Dec-04	0015	2704.7	5°57.4' S	135°46.4' W	0.756	0.016
SS-038	23-Dec-04	1056	2754.6	6°41.1' S	136°24.0' W	0.631	0.021
SS-039	24-Dec-04	0030	2812.8	7°58.8' S	136°35.5' W	0.614	0.013
SS-040	24-Dec-04	1309	2879.0	8°58.6' S	136°32.9' W	0.445	0.017
SS-041	25-Dec-04	0011	2942.0	9°11.7' S	137°25.8' W	0.214	0.023
SS-042	25-Dec-04	1040	3004.6	9°25.6' S	138°22.6' W	0.139	0.048
SS-043	26-Dec-04	0018	3055.8	9°35.3' S	138°52.4' W	0.117	0.026
SS-044	26-Dec-04	2130		9°48.6' S	139°2.0' W	0.623	0.055

*Blank spaces mean no data collected

Table 3: Neuston tow data. Locations are in Table 1.

Station #	Tow Length (m)	Temp (°C)	Salinity (PSU)	Zoop. Biomass (ml)	Zoop.* Density (ml/m ²)	Plastic Pieces (#)	Pellets (#)	Tar (mg)
S196-001-NT	1667	26.8	34.4	151.0	0.0906	5	0	0
S196-003-NT	1574	26.9	34.4	7.0	0.0044	0	0	0
S196-005-NT	741	26.9	34.4	35.0	0.0472	3	0	0
S196-007-NT	1482	27.9	34.4	23.0	0.0155	0	0	0
S196-009-NT	1852	30.1	34.0	7.0	0.0038	3	0	0
S196-010-NT	1852	27.9	34.4	38.0	0.0205	0	0	0
S196-012-NT	1389	25.7	32.9	14.0	0.0101	0	0	0
S196-013-NT	1667	27.8	33.9	23.0	0.0280	3	0	0
S196-015-NT	1852	28.2	33.9	2.0	0.0011	0	0	0
S196-016-NT	1722	27.6	34.3	11.0	0.0064	8	0	0
S196-018-NT	926	27.8	34.1	3.0	0.0032	5	0	0
S196-019-NT	1111	27.4	33.8	17.0	0.0153	2	0	0
S196-020-NT	926	26.9	33.9	2.5	0.0027	1	0	0
S196-021-NT	370	26.9	34.0	10.0	0.0270	4	0	0
S196-023-NT	1852	17.6	33.4	6.0	0.0032	1	0	0
S196-024-NT	1482	27.7	33.5	55.0	0.0371	2	0	0
S196-026-NT	2315	27.8	33.2	15.0	0.0065	2	0	0
S196-027-NT	1852	28.2	33.3	20.0	0.0108	0	3	0
S196-029-NT	463	28.5	33.6	9.0	0.0194	0	0	0
S196-030-NT	556	28.5	33.8	28.0	0.0500	0	0	0
S196-032-NT	926	28.5	33.5	5.0	0.0054	0	0	0
S196-033-NT	1482	28.4	33.8	10.0	0.0067	0	0	0
S196-035-NT	1482	28.5	33.8	4.5	0.0030	0	0	0
S196-036-NT	185	28.8	33.7	5.0	0.0270	0	0	0
S196-037-NT	1296	28.7	33.9	2.0	0.0015	1	0	0
S196-038-NT	1667	28.2	34.1	20.0	0.0120	0	0	0
S196-040-NT	1852	29.2	34.4	<1		0	0	0
S196-041-NT	741	27.5	34.8	29.0	0.0391	0	0	0
S196-043-NT	1111	27.1	34.8	3.0	0.0027	0	0	0
S196-048-NT	1852	26.2	34.5	30.0	0.0162	0	0	0
S196-052-NT	1852	27.1	34.7	2.1	0.0011	0	0	0
S196-055-NT	1852	26.9	34.8	42.0	0.0320	0	0	0
S196-057-NT	1482	26.5	34.6	29.0	0.0196	0	0	0
S196-059-NT	1852	26.4	34.7	30	0.0162	0	0	0
S196-061-NT	1852	26.7	34.7	3	0.0016	0	0	0
S196-063-NT	730	25.7	34.9	25	0.0342	0	0	0
S196-065-NT	1389	25.6	35.1	25	0.0180	0	0	0
S196-067-NT	926	25.8	35.0	9	0.0097	0	0	0
S196-068-NT	1389	26.0	35.2	22.2	0.0160	1	0	0
S196-070-NT	1852	26.8	35.3	20	0.0108	1	0	0
S196-071-NT	1111	26.8	35.2	17	0.0153	0	0	0
S196-073-NT	1852	27.4	35.3	75	0.0405	0	0	0
S196-074-NT	1852	27.6	35.4	11	0.0059	0	0	0
S196-075-NT	1852	28.5	35.7	2	0.0011	0	0	0

*Blank spaces mean no data collected

Table 3 continued

Station #	Tow Length (m)	Temp (°C)	Salinity (PSU)	Zoop. Biomass (ml)	Zoop. Density (ml/m²)	Plastic Pieces (#)	Pellets (#)	Tar (mg)
S196-076-NT	1852	28.4	35.7	10	0.0054	1	0	0
S196-078-NT	1482	28.7	35.7	45	0.0304	0	0	0
S196-080-NT	1204	28.0	35.8	7	0.0058	1	0	0
S196-081-NT	1852	29.0	35.8	12	0.0065	2	0	0
S196-083-NT	1852	26.7	35.8	16.5	0.0089	1	0	0
S196-084-NT	1852	28.8	35.8	31.2	0.0168	0	0	0
S196-086-NT	185	29.3	36.2	1	0.0054	0	0	0
S196-087-NT	370	29.2	36.1	3	0.0081	0	0	0
S196-089-NT	2469	29.0	36.0	1	0.0004	0	0	0

Table 4: Meter net data. Locations are in Table 1.

Station #	Tow Length (m)	Net Diameter (m)	Cast Depth (m)	Zoop. Biomass (ml)	Zoop. Density (ml/m³)
S196-001-MN	727	1	0	43	0.0600
S196-004-MN	1852	1	0	10	0.0137
S196-007-MN	1574	1	0	87	0.1410
S196-010-MN	1852	1	0	80	0.1100
S196-013-MN	1667	1	0	30	0.0460
S196-016-MN	1728	1	0	14	0.0200
S196-019-MN	1111	1	0	26	0.0600
S196-024-MN	1111	1	0	160	0.3670
S196-027-MN	1852	1	0	90	0.1240
S196-030-MN	741	1	0	50	0.1700
S196-033-MN	1482	1	0	20	0.0344
S196-036-MN	185	1	0	7	0.0100
S196-038-MN	1667	1	0	25	0.3800
S196-041-MN	741	1	0	36	0.1200
S196-048-MN	1852	1	0	50	0.0540
S196-055-MN	1852	1	0	80	0.1570
S196-059-MN	1852	1	0	125	0.0860
S196-059-2MN	926	2	113	460	0.1580
S196-063-MN	730	1	0	23	0.3200
S196-065-MN	1389	1	0	30	0.0550
S196-068-MN	1294	1	0	107	0.2100
S196-070-MN	1852	1	0	30	0.0400
S196-071-MN	1111	1	0	50	0.0880
S196-074-MN	1852	1	0	41	0.0560
S196-076-MN	1856	1	0	58	0.0790
S196-078-MN	1667	1	0	200	0.3060
S196-081-MN	1852	1	0	110	0.0760
S196-087-MN	370	1	0	11	0.0380

Table 5: Tucker Trawl data. Locations are in Table 1.

Station #	Tow Length* (m)	Net Area (m²)	Cast Depth* (m)	Zoop. Biomass* (ml)	Zoop. Density* (ml/m³)	Comments
S196-004-TT1	3704	1	0-300	70.0	0.0189	
S196-004-TT2		1				Did not open
S196-004-TT3		1				Did not open
S196-005-TT1	2215	1	300-100	30.0	0.0135	
S196-005-TT2	475	1	100-20	18.0	0.0379	
S196-005-TT3	633	1	20-0	30.0	0.0474	
S196-020-TT1	2037	1	300-100	7.0	0.0034	
S196-020-TT2	1482	1	100-20	6.0	0.0040	
S196-020-TT3	741	1	20-0	34.0	0.0459	
S196-021-TT1	741	1	300-100	1.9	0.0026	
S196-021-TT2	370	1	100-20	1.1	0.0030	
S196-021-TT3	463	1	20-0	41.0	0.0886	
S196-037-TT1	556	1	0-211	30.0	0.0540	Strong current. Did not send messengers
S196-074-TT2	1358	1	150-50	10.0	0.0074	
S196-074-TT3	556	1	50-0	50.0	0.0900	
S196-075-TT1	5556	1	100-150	80.0	0.0144	
S196-075-TT2	1420	1	150-0	102.0	0.0718	
S196-083-TT1	2037	1	450-150	59.0	0.0290	
S196-083-TT2	1235	1	150-50	35.0	0.0283	
S196-083-TT3	1111	1	50-0	137.0	0.1233	
S196-084-TT1	5556	1	450-150	50.0	0.0090	
S196-084-TT2	1852	1	150-50	52.0	0.0281	
S196-084-TT3	1852	1	50-0	62.0	0.0335	

* Blank spaces mean no data collected

Table 6: Hydrocast station data. Locations are in Table 1.

Station #	Bottle #	Depth (m)	O ₂ * (ml/l)	PO ₄ * (mM)	Chl-a* (mg/l)
S196-002-HC	13	0.0		0.475	0.029
	12	15.0		0.394	0.067
	11	30.0		0.399	0.093
	10	40.0		0.649	0.074
	9	49.0		0.699	0.158
	8	60.0		1.717	0.143
	7	69.0		2.022	0.051
	6	75.0		1.956	0.034
	5	79.0		2.816	0.026
	4	90.0		2.811	0.004
	3	110.0		2.776	0.004
	2	129.0		3.010	0.006
	1	158.0		2.938	0.012
S196-008-HC	13	0.0	4.00	0.348	0.061
	12	50.0	4.72	0.267	
	11	99.0	2.57	1.967	
	10	149.0	0.94	2.430	
	9	199.0	0.78	2.694	
	8	248.0	0.49	2.786	
	7	348.0	0.25	2.974	
	6	497.0	0.66	3.071	
	5	645.0	0.57	3.254	
	4	795.0	0.60	3.900	
	3	992.0	0.47	3.025	
	2	1239.0	1.11	4.017	
	1	1487.0	1.31	3.452	
S196-011-HC	13	0.0		0.231	0.025
	12	14.8		0.361	0.065
	11	29.8		0.343	0.03
	10	40.0		0.152	0.086
	9	49.9		1.004	0.044
	8	59.6		1.425	0.156
	7	69.4		1.913	0.074
	6	74.6		2.290	0.042
	5	79.6		2.423	0.026
	4	89.6		2.379	0.015
	3	109.3		2.756	0.005
	2	129.3		2.623	0.003
	1	158.7		2.907	0.036
S196-025-HC	13	0	3.97	0.155	0.035
	12	50	0.88	2.459	
	11	99.3	0.40	2.627	
	10	124.8	0.73	2.853	
	9	149.1	0.14	2.822	

* Blank spaces mean no data collected

Table 6 continued

Station #	Bottle #	Depth (m)	O ₂ * (ml/l)	PO ₄ * (mM)	Chl-a* (mg/l)
S196-025-HC	8	198.9	0.25	3.049	
	7	397.1	0.41	3.403	
	6	596.2	0.69	3.492	
	5	794	0.37	3.878	
	4	991.6	0.79	3.599	
	3	1188.9	0.39	3.466	
	2	1388.9	1.22	3.776	
	1	1461.7	1.33	3.452	
S196-039-HC	13	0.0		0.191	0.011
	12	15.2		0.272	0.024
	11	30.1		0.603	0.022
	10	40.3		0.267	0.023
	9	49.3		0.185	0.038
	8	60.6		0.425	0.034
	7	70.4		0.409	0.033
	6	74.8		0.257	0.025
	5	79.6		0.272	0.046
	4	90.4		0.654	0.039
	3	110.4		0.486	0.038
	2	130.3		1.549	0.030
	1	159.6		2.516	0.008
S196-042-HC	13	0.0	4.27	0.475	
	12	49.3	2.34	0.806	
	11	99.3			
	10	149.8	2.69	1.407	
	9	199.3	1.79	2.318	
	8	298.6	1.44	2.877	
	7	396.8	1.26	2.791	
	6	497.1	0.82	3.585	
	5	595.2	0.85	3.335	
	4	793.8	1.34	3.972	
	3	991.8	1.92	3.712	
	2	1239.5	1.96	3.834	
	1	1486.3	2.78	3.931	
S196-064-HC	13	0.0		0.857	0.050
	12	15.0		0.738	0.040
	11	29.9		0.782	0.041
	10	39.6		0.818	0.028
	9	49.3		0.844	0.034
	8	60.8		0.849	0.076
	7	69.2		0.738	0.070
	6	75.2		0.569	0.030
	5	79.3		0.858	0.026
4	89.4		0.946	0.031	

* Blank spaces mean no data collected

Table 6 continued

Station #	Bottle #	Depth (m)	O₂* (ml/l)	PO₄* (mM)	Chl-a* (mg/l)
S196-064-HC	3	109.6		1.079	0.013
	2	129.6		1.208	0.009
	1	158.5		1.518	0.002
S196-066-HC	13	0.0	4.13	0.628	
	12	49.6	3.26	0.578	
	11	99.5	2.96	0.809	
	10	148.7	4.21	1.195	
	9	199.1	2.98	1.235	
	8	297.4	1.17	2.068	
	7	397.1	1.44	2.361	
	6	496.4	1.33	2.210	
	5	595.0	1.67	2.853	
	4	793.3	1.84	3.155	
	3	998.0	2.17	3.337	
	2	1239.6	2.28	3.395	
	1	1485.6	2.18	3.133	
S196-072-HC	13	0.0	4.44	0.547	
	12	49.7	4.72		
	11	99.5	4.55		
	10	149.2	3.77		
	9	199.4	2.31		
	8	273.5	0.88		
	7	347.5	0.83		
	6	447.5	1.25		
	5	546.3	1.19		
	4	694.1	1.36		
	3	893.1	2.28		
	2	1089.8	2.54		
	1	1219.7	2.49		

* Blank spaces mean no data collected

Table 7: Student research projects, S-196

Title	Student Researchers
The Effects of Color on Vertical Copepod Migration in the Equatorial Pacific	Joel Barkan
Water Masses of the Equatorial Pacific	Lisa (Anny) Barlow Elizabeth Hoering
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