

Cruise Report S-218

Scientific data collected aboard
SSV Robert C. Seamans

Honolulu, HI – San Francisco, CA
20 June – 18 July 2008



Sea Education Association
Woods Hole, Massachusetts

Citation:

Lavender, K., 2008. Final Report for S.E.A. Cruise S-218. Sea Education Association, P.O. Box 6, Woods Hole, MA 02543, USA.

To obtain unpublished data, contact the Chief Scientist or the SEA Data Archivist:

Data Archivist
Sea Education Association
P.O. Box 6
Woods Hole, MA 02543

Phone: 508-540-3954
Fax: 508-457-4673
E-mail: data_archive@sea.edu
Web: www.sea.edu

Table of Contents

Ship's Company	4
Data Description	5
Figure 1: Cruise track	5
Table 1: Oceanographic sampling stations	7
Table 2: Surface station data	10
Table 3: Neuston net tow data	11
Table 4: Meter net tow data	12
Table 5: Hydrocast bottle data	13
Table 6: Student research projects, Cruise S-218	19

Ship's Company

SSV *Robert C. Seamans*, Cruise S-218

Scientific Staff

Kara Lavender	Chief Scientist
Lynn Asbeck	First Assistant Scientist
Patrick Curran	Second Assistant Scientist
Laura Nelson	Third Assistant Scientist

Nautical Staff

Steve Tarrant	Captain
Pamela Coughlin	Chief Mate
Sara Rusche	Second Mate
Jane McCament	Third Mate
James Joslin	Engineer
Ted Quanstrom	Assistant Engineer
Danielle Rioux	Steward

Students

Emily Bome	Roger Williams University
Olympia Bowker	University of Vermont
Claire Collie	St. Mary's College of Maryland
Ryan Cope	University of Maine, Orono
Heather Coulon	Washington State University
Kathryn Day	Kenyon College
Ryan DelGizzi	University of Colorado, Boulder
Celia Farrell	University of Vermont
Patrick Flynn	Georgetown University
Megan Folz	University of Pennsylvania
Lola Grillo	Vassar College
Bente Grinde	Yale University
Carlie Herring	University of Maine, Orono
Matthew LaTronica	Colgate University
Daniel Lieberman	Colgate University
Eric Littman	University of Hawai'i, Manoa
Lars Margolis	Hamilton College
Emily McGlynn	Bryn Mawr College
Rachel Morrison	Boston University
Justin Morrissette	Hampton University
Darcy Mullen	Middlebury College
Kevin Murray	Bentley College
Megan Rawson	Bowdoin College
Robin Rohwer	Oberlin College
Guadalupe Ruiz-Jones	Chaminade University of Honolulu
Anna Sakellariadis	Harvard University
Katrina Wyllie	College of Charleston

Data Description

This cruise report provides a record of data collected aboard the SSV *Robert C. Seamans* during cruise S-218, which departed from Honolulu, Hawai'i on 20 June 2008 and transited through the eastern North Pacific subtropical gyre, arriving in San Francisco on 18 July 2008 (Figure 1).

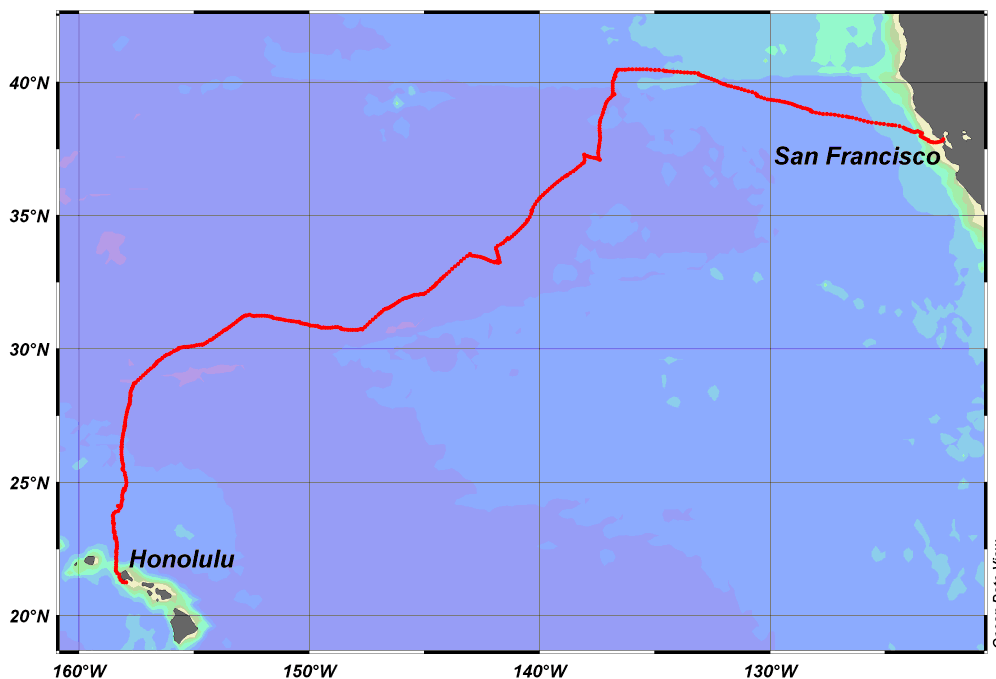


Figure 1: S-218 cruise track plotted from hourly positions.

During the four-week voyage we collected samples or data at 85 discrete oceanographic stations (Table 1), surface samples at 16 locations (Table 2), and we continuously sampled water depth and sub-bottom profiles (CHIRP system), upper ocean currents (Acoustic Doppler Current Profiler, or ADCP), and sea surface temperature, salinity and *in vivo* fluorescence (seawater flow-through system). This report summarizes sea surface biological and chemical characteristics (Tables 2 and 3), and biological and chemical properties with depth (Tables 4 and 5). Lengthy CTD, CHIRP, ADCP, and flow-through data are not reported here. All unpublished data may be made available by arrangement with the Sea Education Association (SEA) data 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, students conduct oceanographic research at sea for studies they have designed prior to the cruise. Student projects span the four major disciplines of oceanography – physical, chemical, biological, and geological oceanography (Table 6). Student research efforts culminate in a written research paper and an oral presentation to the ship's company. The student research papers from cruise S-218 are available upon request from SEA.

Kara Lavender
Chief Scientist, S-218

Table 1: Oceanographic sampling stations.

Station Number	Date	Local Time [#]	Latitude	Longitude	Cast Depth (m)	General Locale
Bathyphtometer						
S218-007-BP	23-Jun-08	2120	23°27.4' N	158°28.4' W	100	North of Oahu
S218-015-BP	25-Jun-08	2105	26°19.1' N	158°08.2' W	100	Subtropical Gyre
S218-024-BP	27-Jun-08	2215	28°43.3' N	157°33.4' W	100	Subtropical Gyre
S218-031-BP	29-Jun-08	2115	30°43.1' N	153°37.6' W	100	Subtropical Gyre
S218-039-BP	1-Jul-08	2111	30°49.7' N	149°34.5' W	100	Subtropical Gyre
S218-047-BP	3-Jul-08	2119	31°54.3' N	145°47.2' W	100	Subtropical Gyre
S218-055-BP	5-Jul-08	2200	33°15.2' N	141°57.5' W	100	Subtropical Gyre
S218-065-BP	8-Jul-08	2105	37°16.4' N	138°03.9' W	100	Subtropical Gyre
S218-073-BP	11-Jul-08	2132	40°25.2' N	134°33.1' W	100	Transition Zone
CTD						
S218-001-HC	22-Jun-08	1015	21°41.2' N	158°23.5' W	549	Offshore of Hawaii
S218-004-HC	23-Jun-08	0915	22°55.5' N	158°23.9' W	494	North of Oahu
S218-006-CTD	23-Jun-08	1518	23°07.9' N	158°27.1' W	245	North of Oahu
S218-009-HC	24-Jun-08	0910	24°06.0' N	158°10.1' W	529	Subtropical Gyre
S218-013-HC	25-Jun-08	0904	25°30.8' N	158°06.1' W	536	Subtropical Gyre
S218-017-HC	26-Jun-08	0905	27°07.2' N	157°59.7' W	534	Subtropical Gyre
S218-021-HC	27-Jun-08	0919	28°15.7' N	157°44.8' W	517	Subtropical Gyre
S218-025-HC	28-Jun-08	0856	29°26.4' N	156°38.3' W	539	Subtropical Gyre
S218-029-HC	29-Jun-08	0923	30°09.3' N	154°39.5' W	516	Subtropical Gyre
S218-033-HC	30-Jun-08	0907	31°14.9' N	152°44.7' W	535	Subtropical Gyre
S218-037-HC	1-Jul-08	0932	31°00.5' N	150°26.1' W	531	Subtropical Gyre
S218-041-HC	2-Jul-08	0857	30°46.1' N	148°37.2' W	532	Subtropical Gyre
S218-045-HC	3-Jul-08	0916	31°30.2' N	146°39.9' W	542	Subtropical Gyre
S218-049-HC	4-Jul-08	0903	32°02.7' N	145°03.5' W	529	Subtropical Gyre
S218-053-HC	5-Jul-08	0924	33°32.6' N	143°01.2' W	512	Subtropical Gyre
S218-057-HC	6-Jul-08	0909	33°27.8' N	141°47.3' W	523	Subtropical Gyre
S218-061-HC	7-Jul-08	0857	34°49.7' N	140°30.8' W	501	Subtropical Gyre
S218-063-CTD	8-Jul-08	0909	36°29.9' N	138°50.1' W	557	Subtropical Gyre
S218-067-HC	10-Jul-08	0901	39°33.1' N	136°44.8' W	560	Transition Zone
S218-071-CTD	11-Jul-08	0907	40°27.7' N	136°17.8' W	522	Transition Zone
S218-075-HC	12-Jul-08	0903	40°19.0' N	133°05.6' W	517	Transition Zone
S218-078-CTD	13-Jul-08	0905	39°31.3' N	130°33.9' W	2933	Transition Zone
S218-080-CTD	14-Jul-08	0858	38°55.9' N	128°13.4' W	540	California Current
S218-083-CTD	15-Jul-08	0904	38°22.9' N	124°42.3' W	505	California Current
Hydrocast						
S218-001-HC	22-Jun-08	1015	21°41.2' N	158°23.5' W	549	Offshore of Hawaii
S218-004-HC	23-Jun-08	0915	22°55.5' N	158°23.9' W	494	North of Oahu
S218-009-HC	24-Jun-08	0910	24°06.0' N	158°10.1' W	529	Subtropical Gyre
S218-013-HC	25-Jun-08	0904	25°30.8' N	158°06.1' W	536	Subtropical Gyre
S218-017-HC	26-Jun-08	0905	27°07.2' N	157°59.7' W	534	Subtropical Gyre
S218-021-HC	27-Jun-08	0919	28°15.7' N	157°44.8' W	517	Subtropical Gyre
S218-025-HC	28-Jun-08	0856	29°26.4' N	156°38.3' W	539	Subtropical Gyre
S218-029-HC	29-Jun-08	0923	30°09.3' N	154°39.5' W	516	Subtropical Gyre

[#] Local time is +10 GMT until 2300 3-Jul-08, and +9 GMT afterwards.

Table 1 continued

Station Number	Date	Local Time[#]	Latitude	Longitude	Cast Depth (m)	General Locale
Hydrocast continued						
S218-033-HC	30-Jun-08	0907	31°14.9' N	152°44.7' W	535	Subtropical Gyre
S218-037-HC	1-Jul-08	0932	31°00.5' N	150°26.1' W	531	Subtropical Gyre
S218-041-HC	2-Jul-08	0857	30°46.1' N	148°37.2' W	532	Subtropical Gyre
S218-045-HC	3-Jul-08	0916	31°30.2' N	146°39.9' W	542	Subtropical Gyre
S218-049-HC	4-Jul-08	0903	32°02.7' N	145°03.5' W	529	Subtropical Gyre
S218-053-HC	5-Jul-08	0924	33°32.6' N	143°01.2' W	512	Subtropical Gyre
S218-057-HC	6-Jul-08	0909	33°27.8' N	141°47.3' W	523	Subtropical Gyre
S218-061-HC	7-Jul-08	0857	34°49.7' N	140°30.8' W	501	Subtropical Gyre
S218-067-HC	10-Jul-08	0901	39°33.1' N	136°44.8' W	560	Transition Zone
S218-075-HC	12-Jul-08	0903	40°19.0' N	133°05.6' W	517	Transition Zone
Meter Net						
S218-011-MN	24-Jun-08	2141	24°44.9' N	158°01.7' W	160	Subtropical Gyre
S218-019-MN	26-Jun-08	2111	27°56.1' N	157°48.7' W	171	Subtropical Gyre
S218-027-MN	28-Jun-08	2119	29°58.5' N	155°42.3' W	177	Subtropical Gyre
S218-036-MN	30-Jun-08	2157	31°10.3' N	151°35.4' W	133	Subtropical Gyre
S218-044-MN	2-Jul-08	2229	30°43.4' N	147°41.4' W	229	Subtropical Gyre
S218-051-MN	4-Jul-08	2158	32°26.5' N	144°17.1' W	201	Subtropical Gyre
S218-060-MN	6-Jul-08	2226	34°07.6' N	141°21.6' W	160	Subtropical Gyre
S218-069-MN	10-Jul-08	2135	40°12.6' N	136°43.1' W	188	Transition Zone
S218-085-2MN	15-Jul-08	2117	38°07.7' N	123°41.0' W	750	California Current
Neuston Net						
S218-002-NT	22-Jun-08	1121	21°40.8' N	158°23.3' W	0	Offshore of Hawaii
S218-003-NT	22-Jun-08	2143	22°21.6' N	158°21.8' W	0	Offshore of Hawaii
S218-005-NT	23-Jun-08	1021	22°54.5' N	158°25.0' W	0	North of Oahu
S218-008-NT	23-Jun-08	2159	23°26.9' N	158°29.2' W	0	North of Oahu
S218-010-NT	24-Jun-08	1025	24°05.0' N	158°11.0' W	0	Subtropical Gyre
S218-012-NT	24-Jun-08	2232	24°42.6' N	158°01.5' W	0	Subtropical Gyre
S218-014-NT	25-Jun-08	1008	25°29.8' N	158°06.2' W	0	Subtropical Gyre
S218-016-NT	25-Jun-08	2130	26°18.9' N	158°08.5' W	0	Subtropical Gyre
S218-018-NT	26-Jun-08	1017	27°06.2' N	158°00.7' W	0	Subtropical Gyre
S218-020-NT	26-Jun-08	2155	27°54.9' N	157°48.1' W	0	Subtropical Gyre
S218-022-NT	27-Jun-08	1037	28°15.7' N	157°45.5' W	0	Subtropical Gyre
S218-023-NT	27-Jun-08	2113	28°42.9' N	157°33.9' W	0	Subtropical Gyre
S218-026-NT	28-Jun-08	0953	29°27.8' N	156°38.1' W	0	Subtropical Gyre
S218-028-NT	28-Jun-08	2152	29°59.1' N	155°41.7' W	0	Subtropical Gyre
S218-030-NT	29-Jun-08	1030	30°09.0' N	154°37.4' W	0	Subtropical Gyre
S218-032-NT	29-Jun-08	2148	30°43.2' N	153°36.6' W	0	Subtropical Gyre
S218-034-NT	30-Jun-08	1006	31°14.4' N	152°43.6' W	0	Subtropical Gyre
S218-035-NT	30-Jun-08	2108	31°11.9' N	151°37.7' W	0	Subtropical Gyre
S218-038-NT	1-Jul-08	1041	30°59.5' N	150°25.2' W	0	Subtropical Gyre
S218-040-NT	1-Jul-08	2140	30°49.5' N	149°34.4' W	0	Subtropical Gyre
S218-042-NT	2-Jul-08	0947	30°45.1' N	148°36.7' W	0	Subtropical Gyre
S218-043-NT	2-Jul-08	2116	30°44.1' N	147°43.5' W	0	Subtropical Gyre

[#] Local time is +10 GMT until 2300 3-Jul-08, and +9 GMT afterwards.

Table 1 continued

Station Number	Date	Local Time[#]	Latitude	Longitude	Cast Depth (m)	General Locale
Neuston Net continued						
S218-046-NT	3-Jul-08	1037	31°30.3' N	146°37.9' W	0	Subtropical Gyre
S218-048-NT	3-Jul-08	2202	31°54.2' N	145°46.4' W	0	Subtropical Gyre
S218-050-NT	4-Jul-08	0953	32°02.7' N	145°02.1' W	0	Subtropical Gyre
S218-052-NT	4-Jul-08	2337	32°42.4' N	144°09.6' W	0	Subtropical Gyre
S218-054-NT	5-Jul-08	1032	33°31.4' N	143°00.6' W	0	Subtropical Gyre
S218-056-NT	5-Jul-08	2229	33°14.7' N	141°57.3' W	0	Subtropical Gyre
S218-058-NT	6-Jul-08	1004	33°26.7' N	141°47.2' W	0	Subtropical Gyre
S218-059-NT	6-Jul-08	2140	34°09.0' N	141°22.6' W	0	Subtropical Gyre
S218-062-NT	7-Jul-08	1004	34°48.9' N	140°31.6' W	0	Subtropical Gyre
S218-064-NT	8-Jul-08	0950	36°29.4' N	138°50.3' W	0	Subtropical Gyre
S218-066-NT	8-Jul-08	2147	37°15.7' N	138°03.8' W	0	Subtropical Gyre
S218-068-NT	10-Jul-08	0945	39°31.8' N	136°45.8' W	0	Transition Zone
S218-070-NT	10-Jul-08	2218	40°11.4' N	136°44.1' W	0	Transition Zone
S218-072-NT	11-Jul-08	1002	40°27.8' N	136°18.8' W	0	Transition Zone
S218-074-NT	11-Jul-08	2205	40°24.8' N	134°32.9' W	0	Transition Zone
S218-076-NT	12-Jul-08	0956	40°18.5' N	133°05.6' W	0	Transition Zone
S218-077-NT	12-Jul-08	2134	39°56.0' N	132°03.1' W	0	Transition Zone
S218-079-NT	13-Jul-08	2132	39°14.5' N	129°20.4' W	0	Transition Zone
S218-081-NT	14-Jul-08	0942	38°55.2' N	128°13.7' W	0	California Current
S218-082-NT	14-Jul-08	2145	38°41.2' N	126°34.3' W	0	California Current
S218-084-NT	15-Jul-08	0947	38°23.3' N	124°41.4' W	0	California Current
Phytoplankton Net						
S218-004-PN	23-Jun-08	0915	22°55.6' N	158°23.7' W	160	North of Oahu
S218-013-PN	25-Jun-08	0921	25°30.5' N	158°06.2' W	188	Subtropical Gyre
S218-021-PN	27-Jun-08	0939	28°15.7' N	157°44.8' W	167	Subtropical Gyre
S218-029-PN	29-Jun-08	0948	30°09.1' N	154°39.0' W	160	Subtropical Gyre
S218-037-PN	1-Jul-08	0951	31°00.2' N	150°25.9' W	164	Subtropical Gyre
S218-045-PN	3-Jul-08	0934	31°30.2' N	146°39.5' W	160	Subtropical Gyre
S218-053-PN	5-Jul-08	0940	33°32.3' N	143°01.1' W	164	Subtropical Gyre
S218-061-PN	7-Jul-08	0914	34°49.5' N	140°31.1' W	157	Subtropical Gyre
Secchi Disk						
S218-006-SD	23-Jun-08	1518	23°07.9' N	158°27.1' W	40	North of Oahu

[#] Local time is +10 GMT until 2300 3-Jul-08, and +9 GMT afterwards.

Table 2: Surface station data.

Station Number	Date	Local Time[#]	Latitude	Longitude	Chl a (µg/l)
SS-001	22-Jun-08	2143	22°21.6' N	158°21.8' W	0.067
SS-003	23-Jun-08	2210	23°26.6' N	158°29.4' W	0.060
SS-004	24-Jun-08	2153	24°44.4' N	158°01.7' W	0.051
SS-005	27-Jun-08	2120	28°42.9' N	157°33.8' W	0.024
SS-006	28-Jun-08	2119	29°26.4' N	156°38.3' W	0.034
SS-007	29-Jun-08	2200	30°43.3' N	153°36.2' W	0.029
SS-008	30-Jun-08	2113	31°11.7' N	151°37.4' W	0.026
SS-009	1-Jul-08	2133	30°49.3' N	149°34.5' W	0.024
SS-010	2-Jul-08	2235	30°43.3' N	147°41.3' W	0.031
SS-011	3-Jul-08	2209	31°54.3' N	145°46.2' W	0.032
SS-012	4-Jul-08	2337	32°42.4' N	144°09.6' W	0.034
SS-013	5-Jul-08	2229	33°14.7' N	141°57.3' W	0.041
SS-014	6-Jul-08	2208	34°08.3' N	141°21.1' W	0.040
SS-015	8-Jul-08	1038	36°29.5' N	138°48.3' W	0.017
SS-016	8-Jul-08	2200	37°15.4' N	138°03.2' W	0.091
SS-018	10-Jul-08	2218	40°11.4' N	136°44.1' W	0.074

[#] Local time is +10 GMT until 2300 3-Jul-08, and +9 GMT afterwards.

Table 3: Neuston net (1-m width, 333 μm mesh) tow data. See Table 1 for station information.

Station Number	Tow Length (m)	Temp. ($^{\circ}\text{C}$)	Salinity (psu)	Zoop. Biomass (ml)	Zoop. Density (ml/m^2)	Plastic Pieces (#)	Plastic Pellets (#)	Tar Pieces (#)
S218-002-NT	1389	26.4	34.82	2.0	0.001	0	0	0
S218-003-NT	2403	25.8	35.09	16.0	0.007	1	0	0
S218-005-NT	2026	25.8	35.07	15.0	0.007	0	0	0
S218-008-NT	1822	26.0	35.15	40.8	0.022	0	0	0
S218-010-NT	2361	25.8	35.19	5.0	0.002	9	0	0
S218-012-NT	2656	25.9	35.31	26.0	0.010	0	0	0
S218-014-NT	1849	25.3	35.42	9.5	0.005	14	0	0
S218-016-NT	1594	25.5	35.49	19.0	0.012	43	0	0
S218-018-NT	2979	25.3	35.51	7.0	0.002	97	0	0
S218-020-NT	1157	25.5	35.40	7.0	0.006	20	0	0
S218-022-NT	2154	25.2	35.43	10.0	0.005	186	0	0
S218-023-NT	1200	25.6	35.46	61.0	0.051	197	0	0
S218-026-NT	1852	25.2	35.48	7.0	0.004	162	0	0
S218-028-NT	1056	25.1	35.50	9.0	0.009	7	2	0
S218-030-NT	2039	24.6	35.33	5.0	0.002	13	0	0
S218-032-NT	1821	24.1	35.25	16.0	0.009	24	0	0
S218-034-NT	1892	24.1	35.40	3.0	0.002	25	0	0
S218-035-NT	3118	23.5	35.24	8.0	0.003	29	0	0
S218-038-NT	1709	23.6	35.30	1.5	0.001	36	1	0
S218-040-NT	1215	23.2	35.36	23.0	0.019	56	5	0
S218-042-NT	1799	22.9	35.18	10.0	0.006	265	0	0
S218-043-NT	1749	22.9	35.11	21.0	0.012	155	0	0
S218-046-NT	1694	23.2	35.45	27.0	0.016	219	0	0
S218-048-NT	2063	22.7	35.18	28.0	0.014	160	0	0
S218-050-NT	1674	22.7	35.14	9.0	0.005	180	0	0
S218-052-NT	2248	22.1	34.63	43.0	0.019	271	1	0
S218-054-NT	1832	22.0	34.70	5.0	0.003	108	0	0
S218-056-NT	1105	21.6	34.33	14.0	0.013	95	0	0
S218-058-NT	2021	21.8	34.54	14.0	0.007	547	0	0
S218-059-NT	1820	21.7	34.47	17.0	0.013	272	0	0
S218-062-NT	1326	21.2	34.12	12.0	0.009	373	0	0
S218-064-NT	1650	20.4	33.47	17.0	0.010	131	0	0
S218-066-NT	2007	20.4	33.42	8.0	0.004	113	14	0
S218-068-NT	2827	17.7	30.80	3.0	0.001	53	0	3
S218-070-NT	1997	18.2	32.82	1.8	0.001	38	0	0
S218-072-NT	1261	18.2	37.75	1.0	0.001	56	0	0
S218-074-NT	2000	17.6	32.82	14.5	0.007	13	0	0
S218-076-NT	1814	18.1	32.99	10.0	0.006	59	0	0
S218-077-NT	1873	17.2	32.78	7.0	0.004	11	1	0
S218-079-NT	2037	16.2	32.78	6.5	0.003	4	0	0
S218-081-NT	1705	15.2	32.63	30.0	0.018	0	0	0
S218-082-NT	2488	15.1	32.58	1720.0	0.691	0	0	0
S218-084-NT	2001	15.2	33.24	46.0	0.023	0	0	0

Table 4: Meter net (1-m diameter, 335 μm mesh) oblique tow data. See Table 1 for station information.

Station Number	Tow Depth (m)	Tow Volume (m³)	Zoop. Biomass (ml)	Zoop. Density (ml/m³)	Gelatinous Organisms (#)	Micronekton Biomass (ml)
S218-011-MN	160	1007	51.0	0.0507	1	6
S218-019-MN	171	742	22.0	0.0296	6	1.5
S218-027-MN	177	759	36.0	0.0474	9	1
S218-036-MN	133	1157	44.0	0.0380	4.5	0
S218-044-MN	229	742	31.0	0.0418	4	0
S218-051-MN	201	892	57.0	0.0639	6.5	0
S218-060-MN	160	1123	61.5	0.0548	8	0
S218-069-MN	188	1575	52.0	0.0330	1	0
S218-085-2MN*	750	10028	544.0	0.0542	—	—

* 1.78-meter diameter, 500 μm mesh net, 20-minute tow at depth. Dashes indicate no data collected.

Table 5: Hydrocast bottle data. See Table 1 for station information.

Station Number	Bottle Depth (m)	O ₂ * (ml/l)	PO ₄ * (µM)	NO ₃ * (µM)	NO ₂ * (µM)	Chl a* (µg/l)	pH*	Total Alk* (Meq/L)
S218-001-HC	3.0					0.084	8.070	
S218-001-HC	15.9					0.073		
S218-001-HC	25.5					0.107		
S218-001-HC	34.3	4.78						
S218-001-HC	49.9					0.233	8.050	
S218-001-HC	64.2							
S218-001-HC	83.9					0.160		
S218-001-HC	99.4					0.168	8.036	
S218-001-HC	148.9	4.84				0.124	8.009	
S218-001-HC	199.0						7.905	
S218-001-HC	298.2						7.763	
S218-001-HC	397.2						7.652	
S218-001-HC	495.3	3.25					7.564	
S218-004-HC	0.0		0.118	0.278	0.437	0.062		
S218-004-HC	15.4		0.252	0.198	0.153			
S218-004-HC	25.2		0.348	0.198	0.374	0.083		
S218-004-HC	35.3							
S218-004-HC	49.5		0.169	0.221	0.516	0.089		
S218-004-HC	65.4	5.10						
S218-004-HC	79.1		0.008	0.315	0.403	0.173		
S218-004-HC	99.8					0.268		
S218-004-HC	124.0	4.65						
S218-004-HC	148.9		0.344	2.021	0.522	0.173		
S218-004-HC	173.9							
S218-004-HC	198.4		0.413	3.815	0.414	0.016		
S218-004-HC	249.1	4.50	0.394	7.313	0.283			
S218-009-HC	3.0					0.135	8.043	3.619
S218-009-HC	15.1							
S218-009-HC	25.0	4.94				0.077	8.065	
S218-009-HC	34.6							
S218-009-HC	49.8						8.037	2.234
S218-009-HC	65.0					0.161		
S218-009-HC	79.8					0.181	8.043	2.457
S218-009-HC	128.9	5.06				0.236		
S218-009-HC	149.0					0.087	8.004	3.703
S218-009-HC	198.1						7.972	
S218-009-HC	298.1						7.791	
S218-009-HC	397.0	4.76					7.680	
S218-009-HC	496.0						7.574	
S218-013-HC	0.0		0.408	0.000	0.074	0.051		
S218-013-HC	20.1							
S218-013-HC	39.8		0.330	0.000	0.000	0.059		
S218-013-HC	64.3		0.399	0.000	0.000	0.064		
S218-013-HC	85.5	5.34						
S218-013-HC	99.3			0.023	0.000	0.114		

* Blank spaces indicate no data collected

Table 5 continued

Station Number	Bottle Depth (m)	O₂* (ml/l)	PO₄* (µM)	NO₃* (µM)	NO₂* (µM)	Chl a* (µg/l)	pH*	Total Alk* (Meq/L)
S218-013-HC	129.2		0.026	0.102	0.051	0.251		
S218-013-HC	149.2		0.362	1.165	0.363	0.107		
S218-013-HC	174.3		0.376			0.115		
S218-013-HC	199.1		0.578	3.592	0.000			
S218-013-HC	248.6	4.89						
S218-013-HC	347.9	5.06	0.960	18.510	0.000			
S218-013-HC	496.3		1.517	34.923	0.000			
S218-017-HC	3.0					0.034	7.990	2.134
S218-017-HC	15.6							
S218-017-HC	30.0					0.039	8.032	
S218-017-HC	39.6	4.89						
S218-017-HC	60.0					0.064	8.004	2.362
S218-017-HC	79.5					0.093		
S218-017-HC	99.1						8.006	2.146
S218-017-HC	139.3	5.63				0.231		
S218-017-HC	149.0					0.225		2.143
S218-017-HC	198.4						7.874	
S218-017-HC	297.5						7.770	
S218-017-HC	397.8	5.34					7.704	
S218-017-HC	496.7						7.562	
S218-021-HC	0.0		0.293	1.029	0.374	0.032		
S218-021-HC	20.4		0.390	0.119	0.000	0.034		
S218-021-HC	35.1		0.008	0.051	0.000			
S218-021-HC	50.2	5.31				0.048		
S218-021-HC	74.4		0.095	0.037	0.000	0.076		
S218-021-HC	99.1					0.113		
S218-021-HC	124.8		0.081	0.896	0.187			
S218-021-HC	158.5		0.592	2.563	0.170	0.062		
S218-021-HC	173.9	4.73				0.015		
S218-021-HC	198.6		0.684	6.619	0.017	0.001		
S218-021-HC	248.2							
S218-021-HC	296.8	4.70						
S218-021-HC	397.2		1.006	11.583	0.130			
S218-025-HC	3.0					0.028	8.018	2.381
S218-025-HC	15.2						8.053	
S218-025-HC	25.4					0.017		
S218-025-HC	49.7					0.032	8.004	3.485
S218-025-HC	69.5						7.987	
S218-025-HC	84.5	5.07				0.048		
S218-025-HC	99.5						7.988	2.736
S218-025-HC	109.1	5.09				0.111		
S218-025-HC	149.1					0.120	7.911	2.347
S218-025-HC	198.5						7.856	
S218-025-HC	297.9						7.757	
S218-025-HC	397.2						7.718	

* Blank spaces indicate no data collected

Table 5 continued

Station Number	Bottle Depth (m)	O₂* (ml/l)	PO₄* (µM)	NO₃* (µM)	NO₂* (µM)	Chl a* (µg/l)	pH*	Total Alk* (Meq/L)
S218-025-HC	496.2	3.68					7.578	
S218-029-HC	0.0		0.000	0.028	0.000	0.014		
S218-029-HC	0.7		0.178	0.000	0.000			
S218-029-HC	8.9		0.081	0.000	0.000			
S218-029-HC	20.1	5.08				0.017		
S218-029-HC	74.5		0.000	0.201	0.000	0.056		
S218-029-HC	99.0					0.149		
S218-029-HC	128.9		0.109	0.343	0.062	0.114		
S218-029-HC	148.7	5.90				0.099		
S218-029-HC	197.2		0.468	4.170	0.000			
S218-029-HC	198.5							
S218-029-HC	347.7		0.647	9.077	0.028			
S218-029-HC	447.3	4.43						
S218-029-HC	495.2		0.657	13.153	0.403			
S218-033-HC	3.0					0.017	7.985	2.604
S218-033-HC	10.6						8.008	
S218-033-HC	20.4					0.026	8.126	
S218-033-HC	49.6					0.036	7.968	2.983
S218-033-HC	69.2					0.058	7.955	2.417
S218-033-HC	79.7	5.69					7.971	
S218-033-HC	104.3					0.113	7.939	
S218-033-HC	129.0					0.203	7.898	2.796
S218-033-HC	198.5	5.44					7.815	
S218-033-HC	297.1						7.762	
S218-033-HC	396.3	4.58					7.657	
S218-033-HC	495.8						7.571	
S218-037-HC	0.0		0.118	0.119	0.000	0.016		
S218-037-HC	15.7		0.095	0.026	0.000			
S218-037-HC	29.1		0.247	0.099	0.000	0.017		
S218-037-HC	49.5		0.496	0.031	0.051	0.065		
S218-037-HC	79.0	5.26						
S218-037-HC	99.1		0.150	0.023	0.000	0.127		
S218-037-HC	128.1		0.302	0.354	0.000	0.096		
S218-037-HC	173.9		0.477	4.456	0.000	0.034		
S218-037-HC	198.3	5.14						
S218-037-HC	272.3		0.937	8.569	0.000			
S218-037-HC	357.6		1.186	11.191	0.113			
S218-037-HC	396.4	4.77						
S218-037-HC	476.5							
S218-041-HC	3.0					0.029	8.003	2.393
S218-041-HC	15.6						7.872	2.609
S218-041-HC	29.9	4.94				0.034		
S218-041-HC	49.5						7.990	2.006
S218-041-HC	74.8					0.058	7.990	
S218-041-HC	99.4						7.948	

* Blank spaces indicate no data collected

Table 5 continued

Station Number	Bottle Depth (m)	O₂* (ml/l)	PO₄* (µM)	NO₃* (µM)	NO₂* (µM)	Chl a* (µg/l)	pH*	Total Alk* (Meq/L)
S218-041-HC	120.1					0.119	7.944	
S218-041-HC	149.2					0.092	7.882	2.297
S218-041-HC	173.8	5.33				0.067		
S218-041-HC	198.7						7.833	
S218-041-HC	297.6						7.763	
S218-041-HC	396.8	4.81					7.709	
S218-041-HC	495.4						7.557	
S218-045-HC	0.0		0.150	0.550	0.090	0.042		
S218-045-HC	15.5		0.091	0.252	0.077			
S218-045-HC	30.2		0.224	0.264	0.119	0.061		
S218-045-HC	74.9	5.26				0.082		
S218-045-HC	99.5		0.390	0.116	0.056	0.125		
S218-045-HC	124.7		0.265	0.190	0.029	0.202		
S218-045-HC	139.4		0.192	0.377	0.092	0.272		
S218-045-HC	178.2					0.063		
S218-045-HC	197.2		0.624	1.837	0.074			
S218-045-HC	198.3	4.53						
S218-045-HC	346.8		1.034	5.743	0.015			
S218-045-HC	347.0							
S218-045-HC	496.0	3.54						
S218-049-HC	3.0					0.050	8.004	2.110
S218-049-HC	25.1						8.035	2.304
S218-049-HC	50.2					0.080	7.986	
S218-049-HC	74.4	5.38						
S218-049-HC	99.6					0.181	7.980	1.978
S218-049-HC	114.2					0.242		
S218-049-HC	129.0					0.284	7.935	
S218-049-HC	158.4					0.141	7.880	2.318
S218-049-HC	197.8						7.835	
S218-049-HC	247.6	4.87						
S218-049-HC	292.4						7.772	
S218-049-HC	401.8						7.680	
S218-049-HC	505.8	5.13					7.533	
S218-053-HC	0.0		0.132	0.601	0.000	0.044		
S218-053-HC	15.6		0.091	0.159	0.017			
S218-053-HC	25.7		0.040	0.105	0.051	0.061		
S218-053-HC	49.9					0.081		
S218-053-HC	84.0		0.201	0.150	0.000	0.112		
S218-053-HC	98.8	5.42				0.151		
S218-053-HC	129.6		0.371	0.825	0.516	0.220		
S218-053-HC	149.1	5.20				0.116		
S218-053-HC	198.3		0.850	5.550	0.181			
S218-053-HC	199.1							
S218-053-HC	248.2		0.928	16.044	0.000			
S218-053-HC	322.7	4.57						

* Blank spaces indicate no data collected

Table 5 continued

Station Number	Bottle Depth (m)	O₂* (ml/l)	PO₄* (µM)	NO₃* (µM)	NO₂* (µM)	Chl a* (µg/l)	pH*	Total Alk* (Meq/L)
S218-053-HC	397.6		1.628	29.594	1.066			
S218-057-HC	3.0					0.050	7.986	
S218-057-HC	20.2						7.987	
S218-057-HC	34.2					0.053	7.866	
S218-057-HC	48.9						7.947	
S218-057-HC	74.7	5.44				0.115		
S218-057-HC	99.3					0.216	7.964	
S218-057-HC	129.4					0.237	7.950	
S218-057-HC	154.8					0.119	7.913	
S218-057-HC	197.9						7.817	
S218-057-HC	272.8	5.09					7.760	
S218-057-HC	347.5						7.713	
S218-057-HC	447.0	3.39					7.561	
S218-057-HC	501.0						7.490	
S218-061-HC	0.0		0.155	0.000	0.028	0.070		
S218-061-HC	10.2		0.132	0.125	0.198			
S218-061-HC	19.9		0.160	0.196	0.000	0.078		
S218-061-HC	49.7		0.293	0.096	0.096	0.125		
S218-061-HC	79.4	5.72	0.445			0.237		
S218-061-HC	99.4		0.279	0.142	0.119	0.289		
S218-061-HC	119.4			1.060	0.465	0.178		
S218-061-HC	139.5		0.574	2.404	0.221	0.109		
S218-061-HC	198.1	4.69						
S218-061-HC	272.8		1.338	19.248	0.232			
S218-061-HC	446.4		2.115	41.216	0.108			
S218-061-HC	490.4	2.63						
S218-067-HC	0.0					0.044	7.794	
S218-067-HC	14.3						7.816	
S218-067-HC	29.6					0.124	7.790	
S218-067-HC	49.6						7.796	
S218-067-HC	74.1					0.341	7.763	
S218-067-HC	100.0					0.075	7.744	
S218-067-HC	123.4	5.83				0.015	7.734	
S218-067-HC	148.9					0.006	7.721	
S218-067-HC	198.7						7.664	
S218-067-HC	247.6	4.48					7.658	
S218-067-HC	298.0						7.629	
S218-067-HC	396.8	2.43					7.565	
S218-067-HC	495.8						7.534	
S218-075-HC	3.0						7.920	
S218-075-HC	15.5						7.951	
S218-075-HC	29.8						7.909	
S218-075-HC	44.6						7.923	
S218-075-HC	75.3						7.854	
S218-075-HC	99.7						7.835	

* Blank spaces indicate no data collected

Table 5 continued

Station Number	Bottle Depth (m)	O₂* (ml/l)	PO₄* (μM)	NO₃* (μM)	NO₂* (μM)	Chl a* (μg/l)	pH*	Total Alk* (Meq/L)
S218-075-HC	124.1						7.800	
S218-075-HC	139.5						7.718	
S218-075-HC	154.4	5.09					7.686	
S218-075-HC	198.8						7.642	
S218-075-HC	297.5	2.65					7.476	
S218-075-HC	396.9						7.419	
S218-075-HC	496.0	1.26					7.338	

* Blank spaces indicate no data collected

Table 6: Student research projects, Cruise S-218.

Title	Student Investigators
Interannual Variability in Northeast Pacific Heat Content	Olympia Bowker Celia Farrell
Microplastic Distribution in the North Pacific	Claire Collie Bente Grinde
The Characteristics and Distribution of Plastic along the S-218 Cruise Track through the Northeastern Pacific Ocean	Ryan Cope Patrick Flynn Carlie Herring Darcy Mullen
Lanternfish (Myctophidae) of the Northeastern Pacific: Influence of Surface Water Mass on their Abundance, Distribution, Size, and Presence of Copepod Parasitism	Heather Coulon Rachel Morrison
The Distribution of Seabirds and Plastic in the Northeastern Pacific Ocean	Katy Day Eric Littman
The Effects of pH, Alkalinity, and DIC on the Biogeographic Distributions of Calcifying Organisms in the North Pacific Ocean	Ryan DelGizzi Megan Folz Dan Lieberman Kevin Murray Anna Sakellariadis
Bioluminescence in the North Pacific: Profiling the Upper Epipelagic Zone	Lola Grillo Matthew LaTronica
Nitrate and Phosphate Ratio Nondependent Phytoplankton Communities in the Bloom-prone North Pacific Subtropical Gyre	Emily McGlynn Emily Bome
The Relationships between Viral and Bacterial Abundance and Nutrient Cycling in the Mixed Layer of the North Pacific	Justin Morrisette Robin Rohwer
Variability in Mixed Layer Depth as a Function of Wind Speed, and Average Oxygen Saturation as a Function of Mixed Layer Depth in the North Pacific	Megan B. Rawson Lars B. Margolis
The Abundance and Distribution of Epineuston Organisms across the Northeastern Pacific Ocean	Guadalupe Ruiz-Jones
Comparison of ADCP Echo Intensity to Zooplankton Biomass Density: Honolulu to San Francisco	Katrina Wyllie