

UNIVERSITY OF CALIFORNIA SCRIPPS INSTITUTION OF OCEANOGRAPHY

data report

PHYSICAL AND CHEMICAL DATA

CCOFI Cruise 6109 (WESTWIND DRIFT)
31 August - 19 September 1961

and

CCOFI Cruise 6110-11
10 October - 12 November 1961

SIO Reference 62-17
26 July 1962

UNIVERSITY OF CALIFORNIA
SCRIPPS INSTITUTION OF OCEANOGRAPHY

PHYSICAL AND CHEMICAL DATA

CCOFI Cruise 6109
31 August - 19 September 1961

and

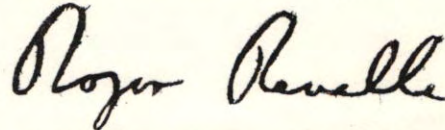
CCOFI Cruise 6110-11
10 October - 12 November 1961

Sponsored by

Marine Research Committee

SIO Reference 62-17
26 July 1962

Approved for distribution:



Roger Revelle, Director

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INTRODUCTION

The data presented in this report were collected by the RV Horizon of the Scripps Institution of Oceanography on Cruise 6109 of the California Cooperative Oceanic Fisheries Investigations program and by the RV Black Douglas of the Bureau of Commercial Fisheries and the RV Horizon of the Scripps Institution on Cruise 6110-11. The first two figures in this cruise numbering system represent the year of the cruise; the last two figures, the month. In the case of quarterly cruises the last figures are hyphenated. The cruises preceding this one in the series are 6008, 6009 and 6009-10 (Scripps Institution report, SIO Ref. 62-10), 6101-2 (SIO Ref. 61-24), 6103, 6104-5 and 6105 (SIO Ref. 62-15) and 6107-8 and 6108 (SIO Ref. 62-16).

The data are tabulated at observed depths; the interpolated and computed values are tabulated at standard depths and are accompanied by charts of horizontal distribution. The presentation of data in this report does not constitute publication; however, the data contained in this report have been carefully edited and no modifications should be necessary before final publication.

STANDARD PROCEDURES

Processing of the data was carried out using the method described by Klein.^{1/} Certain approximations have been introduced for the determination of the integrated pressure terms which may result in errors whose maximum values are less than 0.5 dynamic centimeter at 0 over 200 decibars, 1.0 dynamic centimeter at 0 over 500 decibars, and 2.0 dynamic centimeters at 0 over 1000 decibars. The 125-meter level was introduced into the integration to obtain greater accuracy in the determination of ΔD .

To indicate degree of accuracy, temperatures are recorded in tenths of a degree when obtained by bucket thermometer, thermograph, or bathythermograph, while temperatures from reversing thermometers are recorded in hundredths of a degree. The salinity values obtained by salinometer are recorded to three decimal places, provided they meet accepted standards. The third decimal place has been offset to emphasize that the accuracy of the observations is not to one unit in that place, but that the values recorded "have a reproducibility of $\pm 0.004\%$ salinity at the 95 percent probability level, and a probable accuracy of $\pm 0.01\%$ salinity or better at the same level of probability."^{2/} The values are recorded to two decimal places when

^{1/}Klein, Hans T. A new technique for processing physical oceanographic data. MS.

^{2/}Quotation from Department of Oceanography, University of Washington, Tech. Rep. No. 66, UW Ref. 60-18, October 1960.

obtained by chlorinity titration, or by salinometer where only one determination per sample was obtained, or where there is doubt concerning the accuracy of a particular sample, or of all samples on a station. The accuracy of all samples obtained by salinometer and recorded to two decimal places is believed to be equal to or better than those obtained by manual titration.

Extrapolated values and values interpolated between remote observations are entered within parentheses. A hyphen is used to indicate a missing observed value. The time is the time of messenger release. When more than one cast was made on a station, messenger times and wire angles are given in the order of increasing depth. A line is left blank between the observed data of each cast.

On stations where more than one cast is lowered, the various property curves may not agree perfectly. This discrepancy may be caused by changes in geographical position, real property changes with time, slight error in measurement, or a combination of these factors. Stations with overlapping casts have the following footnote: Overlapping casts; reconciliation of property curves when necessary.

FOOTNOTES

Laboratory personnel, before titrating the salinity samples, note any possible imperfections in the sealing of the bottles as follows:

Loose bottle cap: The cap is definitely loose so that it could be moved with very little applied pressure. The salinity values obtained from these samples may be usable depending on time and/or conditions of storage.

Possible evaporation: Either the cap was sealed with less than usual pressure, the bottle edge chipped, the rubber washer cracked, or the bale broke on opening, etc.

Use of the above values in interpolation depends upon consistency with other values of salinity and other properties, and these footnotes are supplemented with "falls on property curve" or "does not fall on property curve," depending upon whether the property curve was drawn through the value or not.

In addition to footnotes, three special notations are used without footnotes because their meaning is always the same.

To indicate a premature or a delayed reversal of the water-sampling device which results in certain depth and property errors, the following notation is used.

p: pretrip or posttrip.

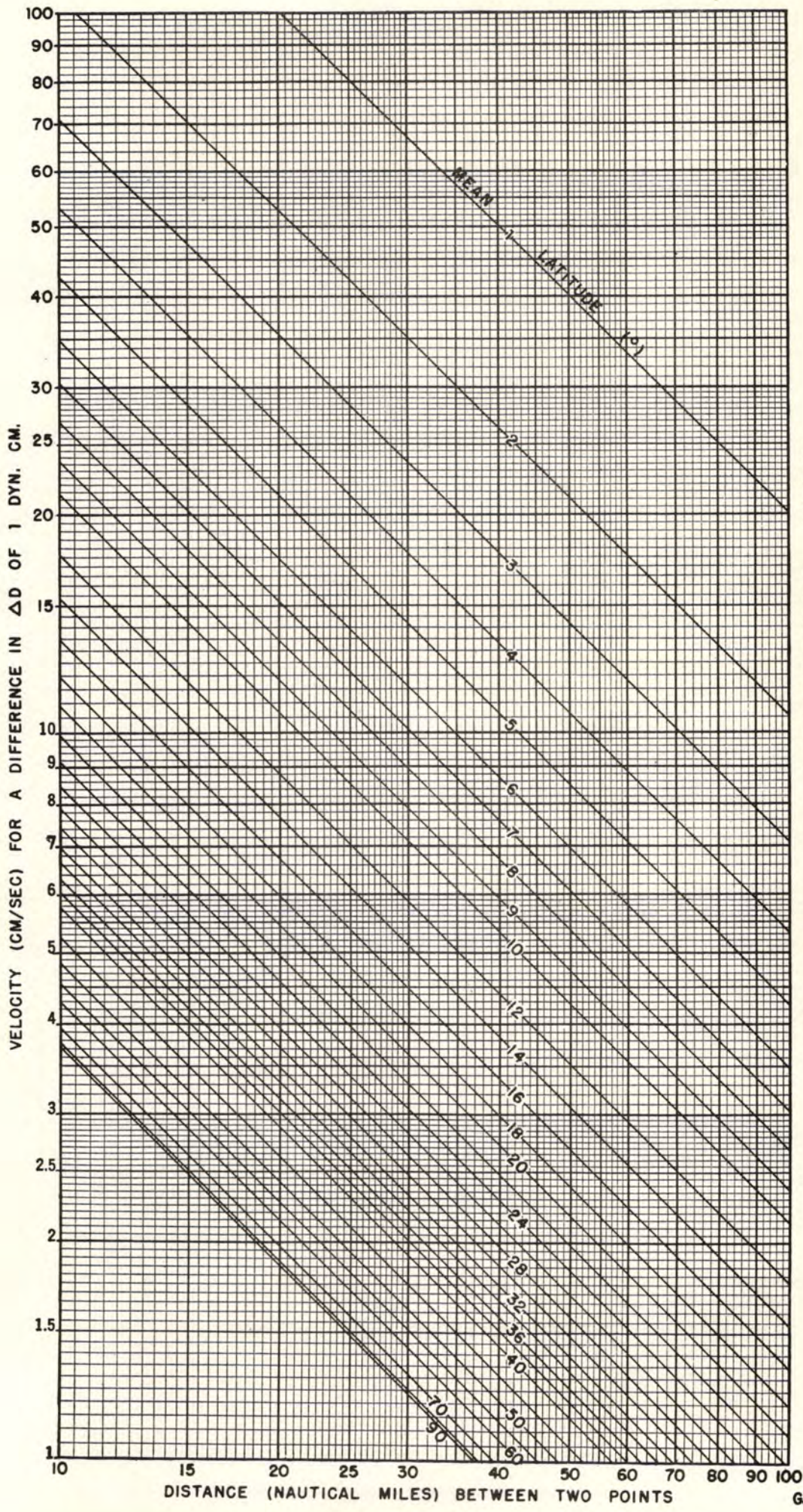
Values which are not drawn through because they seem to be in error without apparent reason are indicated by one of the following notations.

r: rejected value (value seems to be definitely wrong),

u: uncertain value (value may be correct; occasionally it can influence the drawing of the property curve).

FORMAT

These data are typed in the format of the University of California Press publication, Oceanic Observations of the Pacific. So that these pages can be used as copy for the 1961 volume, the first page of Cruise 6109 data is numbered 176; Cruise 6110-11, 179.



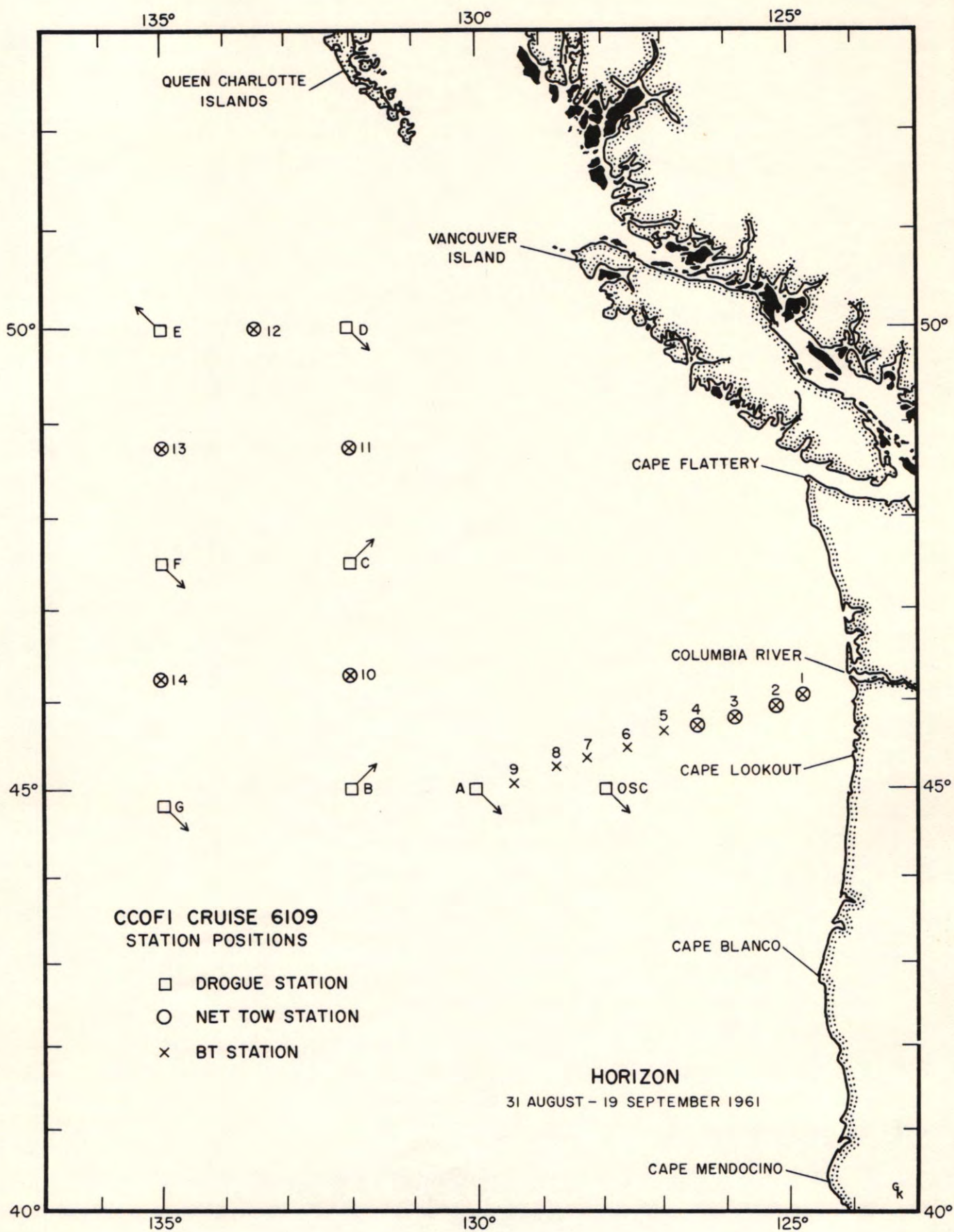
VELOCITY OF GEOSTROPHIC FLOW

DISTANCE (NAUTICAL MILES) BETWEEN TWO POINTS

G.I.R.

FIGURES

1. CCOFI Cruise 6109, station positions



DATE		TIME		LATITUDE		LONGITUDE	
DD	MM	HH	MM	N	W	N	W

PERSONNEL
Cruise 6109

SHIP'S CAPTAIN

Davis, Laurence E., RV Horizon

PERSONNEL PARTICIPATING IN THE COLLECTION OF DATA

RV Horizon

Brennen, Robert E., Senior Marine Technician

Brown, Daniel M., Senior Marine Technician

Denton, Peter H., Engineering Aid

Engebretson, David W., Marine Technician

*Fleminger, Abraham, Assistant Research Biologist

**Hodnett, Haley L., Marine Technician

*Holland, William R., Student

*Isaacs, John D., Associate Professor of Oceanography and Program Director,
Marine Life Research

Nordback, John H., Laboratory Technician

Wagner, Vaughn M., Fishery Aid, Bureau of Commercial Fisheries

*Left ship at Astoria.

**Transferred to USCGC Yocona at Astoria.

SIO

CCOFI
6109

OBSERVED				COMPUTED	INTERPOLATED				COMPUTED		
Z	T	S	O ₂	δ _T	Z	T	S	O ₂	σ _t	δ _T	ΔD
m	°C	‰	ml/L	cl/ton	m	°C	‰	ml/L	g/L	cl/ton	dyn m

A HORIZON; August 31, 1961; 0230 GCT; 45°00'N, 130°00'W; sounding, 1440 fm; wind, 210°, force 5; weather, rain; sea, very rough; wire angle, 27°.

1	17.98	32.64	0	4.40	440	0	(17.98)	(32.64)	(4.40)	(23.49)	(440)	(0.00)
9	17.97	32.67	4.46	438	10	17.96	32.68	4.46	23.53	437	0.04	
23	17.36	32.79	1	-	415	20	17.83	32.74	4.53	23.61	430	0.09
32	15.51	32.70	2	4.84	381	30	16.05	32.72	4.79	24.01	391	0.13
50	10.58	32.70	7	5.31	288	50	10.58	32.71	5.31	25.09	288	0.20
68	9.20	32.72	5	5.14	265	75	9.02	32.73	5.15	25.36	262	0.27
91	8.70	32.73	5	5.13	258	100	8.50	32.75	5.08	25.46	253	0.33
113	8.18	32.93	1	4.69	235	125	7.92	33.13	4.26	25.84	217	0.39
135	7.78	33.33	1	3.92	200	150	7.67	33.54	3.65	26.20	183	0.44
180	7.44	33.77	2	3.30	162	200	7.15	33.83	3.08	26.50	154	0.53
268	6.02	33.92	2	2.25	133	250	6.29	33.91	2.47	26.68	137	0.60
359	5.13	33.99	0	1.14	118	300	5.63	33.95	1.72	26.79	126	0.67
451	4.68	34.17	9u	0.75	-	400	4.89	34.01	0.92	26.93	114	0.79
545	4.43	34.12	7	0.41	100	500	4.54	34.08	0.57	27.02	105	0.91
641	4.22	34.34	6u	0.18	-	600	4.31	34.18	0.27	27.12	95	1.01
737	4.00	34.29	8	0.09	83	700	4.09	34.27	0.10	27.22	86	1.11
931	3.62	34.43	0	0.10	69	800	3.88	34.35	0.09	27.30	78	1.20
1127	3.10	34.50	8	0.17	59	1000	3.47	34.46	0.12	27.43	66	1.35

B HORIZON; September 3, 1961; 0924 GCT; 45°00'N, 132°00'W; sounding, 1580 fm; wind, 270°, force 4; weather, cloudy; sea, rough; wire angle, 14°.

1	17.62	32.77	2	4.60	422	0	(17.62)	(32.77)	(4.60)	(23.68)	(423)	(0.00)
11	17.61	32.77	7	4.54	422	10	17.61	32.78	4.54	23.69	422	0.04
30	12.82	32.75	0	5.82	324	20	17.60	32.78	4.54	23.69	421	0.08
35	11.17	32.69	6	5.90	299	30	12.82	32.75	5.82	24.71	324	0.12
39	10.56	32.75	0	5.66	285	50	9.84	32.78	5.56	25.27	271	0.18
49	9.88	32.78	4	5.57	271	75	8.74	32.78	5.42	25.44	254	0.25
75	8.74	32.77	9	5.42	255	100	8.05	32.80	5.42	25.56	243	0.31
107	7.92	32.81	4	5.42	240	125	7.71	33.01	4.71	25.78	223	0.37
121	7.72	32.95	7	4.85	227	150	7.69	33.57	3.63	26.22	181	0.42
146	7.70	33.52	7	3.78	184	200	7.15	33.86	2.62	26.52	152	0.50
195	7.22	33.84	0	2.61	154	250	6.37	33.93	2.58	26.68	137	0.58
241	6.49	33.92	1	2.68	139	300	5.77	33.97	1.89	26.79	127	0.65
289	5.90	33.96	1	2.09	129	400	4.96	34.02	0.98	26.93	114	0.77
386	5.06	34.01	2	1.06	115	500	4.46	34.08	0.66	27.03	104	0.88
581	4.20	34.13	8	0.46	97	600	4.15	34.15	0.41	27.12	96	0.99
777	3.82	34.30	3	0.13	81	700	3.97	34.24	0.21	27.21	87	1.09
975	3.36	34.39	8	0.15	69	800	3.78	34.32	0.13	27.29	79	1.17
1172	2.98	34.46	5	0.21	61	1000	3.29	34.41	0.16	27.41	68	1.34

C HORIZON; September 6, 1961; 0357 GCT; 47°30'N, 132°00'W; sounding, 1650 fm; wind, 290°, force 3; weather, cloudy; sea, rough; wire angle, 35°.

1	16.16	32.60	6	5.06	402	0	(16.16)	(32.61)	(5.06)	(23.90)	(402)	(0.00)
9	16.12	32.60	3	4.93	401	10	16.12	32.60	4.93	23.90	402	0.04
30	16.10	32.60	4	4.98	401	20	16.10	32.60	4.93	23.90	401	0.08
42	11.42	32.72	1	6.05	302	30	16.10	32.60	4.98	23.90	401	0.12
50	10.32	32.73	6	6.18	282	50	10.32	32.74	6.18	25.16	282	0.19
67	8.66	32.77	4	5.86	254	75	8.12	32.78	5.91	25.54	246	0.26
83	7.95	32.78	3	5.93	243	100	7.50	32.84	5.73	25.67	233	0.32
100	7.50	32.83	9	5.73	233	125	7.39	33.24	4.98	26.00	201	0.37
129	7.42	33.29	2	4.87	198	150	6.70	33.54	3.91	26.33	170	0.42
157	6.82	33.64	8	3.67	164	200	6.60	33.88	2.77	26.61	143	0.50
185	6.70	33.84	5	2.94	147	250	5.93	33.92	2.18	26.73	132	0.57
269	5.72	33.93	3	2.02	129	300	5.44	33.95	1.85	26.81	124	0.63
365	4.91	33.97	1	1.52	117	400	4.62	33.98	1.37	26.93	113	0.76
454	4.30	34.01	1	1.14	108	500	4.17	34.05	0.91	27.04	103	0.87
557	4.06	34.11	0	0.66	98	600	3.98	34.15	0.48	27.13	94	0.97
681	3.84	34.20	9	0.29	88	700	3.80	34.22	0.27	27.21	87	1.07
851	3.45	34.30	0	0.20	78	800	3.57	34.28	0.21	27.28	80	1.16
1075	3.02	34.40	7	0.21	66	1000	3.16	34.37	0.20	27.39	70	1.32

OBSERVED				COMPUTED	INTERPOLATED				COMPUTED		
Z	T	S	O ₂	δ _T	Z	T	S	O ₂	σ _t	δ _T	ΔD
m	°C	‰	ml/L	cl/ton	m	°C	‰	ml/L	g/L	cl/ton	dyn m

HORIZON; September 8, 1961; 1822 GCT; 50°02'N, 132°03'W; sounding, 1680 fm; wind, 270°, force 4; weather, overcast; sea, very rough; wire angle, 48°.

D

1	14.31	31.75	0	5.14	427	0	(14.31)	(31.75)	(5.14)	(23.64)	(427)	(0.00)
7	14.28	31.74	9	5.22	426	10	14.28	31.75	5.19	23.64	426	0.04
24	14.28	31.75	2	4.88	426	20	14.28	31.75	4.94	23.64	426	0.09
35	13.83	31.75	5	5.05	417	30	13.86	31.75	4.93	23.73	418	0.13
41	12.88	31.92	3	5.12	386	50	11.70	32.25	5.26	24.53	341	0.20
54	10.45	32.26	4	5.32	319	75	8.32	32.58	5.65	25.35	263	0.28
66	8.84	32.50	5	5.52	276	100	7.59	32.73	5.60	25.57	242	0.34
89	7.82	32.66	1	5.71	250	125	7.41	33.15	4.15	25.93	208	0.40
106	7.50	32.78	4	5.45	237	150	7.09	33.54	3.48	26.28	175	0.45
113	7.45	32.98	7	4.62	221	200	6.31	33.90	2.58	26.67	138	0.53
129	7.40	33.20	7	4.03	204	250	5.66	33.96	2.12	26.80	126	0.60
176	6.61	33.80	0	2.99	150	300	5.22	33.97	1.66	26.86	120	0.66
224	6.00	33.94	5	2.28	131	400	4.70	34.04	1.01	26.97	109	0.78
268	5.46	33.96	2	2.04	124	500	4.40	34.19	0.56	27.12	95	0.88
332	5.07	33.97	6	1.30	118	600	4.04	34.21	0.33	27.18	90	0.98
387	4.74	34.02	4	1.06	111							
482	4.47	34.17	9	0.62	97							
619	3.98	34.21	7	0.30	89							

HORIZON; September 11, 1961; 0736 GCT; 50°00'N, 135°00'W; sounding, 1873 fm; wind, 320°, force 3; weather, overcast; sea, moderate; wire angle, 10°.

E

1	15.04	32.40	1	4.74	393	0	(15.04)	(32.40)	(4.74)	(23.98)	(394)	(0.00)
11	14.90	32.37	3	4.52	393	10	14.91	32.37	4.52	23.99	393	0.04
31	13.94	32.62	6	4.78	355	20	14.65	32.41	4.56	24.07	385	0.08
40	10.92	32.66	5	5.15	297	30	14.10	32.62	4.76	24.35	359	0.12
50	7.90	32.73	9	5.34	246	50	7.90	32.74	5.34	25.54	246	0.18
60	7.12	32.75	8	5.44	234	75	6.80	32.78	5.47	25.72	228	0.24
75	6.80	32.78	3	5.47	228	100	6.40	32.94	5.12	25.90	211	0.29
99	6.40	32.92	8	5.15	212	125	6.34	33.36	4.49	26.24	179	0.34
125	6.34	33.36	4	4.49	179	150	6.26	33.75	3.65	26.55	149	0.38
154	6.22	33.78	3	3.55	146	200	5.58	33.87	2.93	26.73	132	0.45
209	5.46	33.87	2	2.86	130	250	5.03	33.89	2.39	26.81	124	0.52
321	4.52	33.91	4	1.84	117	300	4.67	33.90	1.98	26.86	120	0.58
425	4.13	33.99	8	1.23	107	400	4.19	33.98	1.37	26.98	109	0.70
542	3.91	34.13	0	0.55	95	500	3.99	34.09	0.75	27.09	99	0.81
664	3.64	34.21	9	0.34	85	600	3.78	34.18	0.43	27.18	90	0.90
825	3.38	34.30	1	0.19	77	700	3.57	34.24	0.30	27.25	83	1.00
1004	3.08	34.38	6	0.28	68	800	3.42	34.29	0.21	27.30	78	1.08
1207	2.74	34.43	9	0.22	61	1000	3.09	34.38	0.28	27.40	68	1.24
						1200	2.76	34.44	0.23	27.48	61	1.38

SIO
CCOFI
6109

OBSERVED				COMPUTED	INTERPOLATED				COMPUTED		
Z	T	S	O ₂	δ _T	Z	T	S	O ₂	σ _t	δ _T	ΔD
m	°C	‰	ml/L	cl/ton	m	°C	‰	ml/L	g/L	cl/ton	dyn m

F HORIZON; September 15, 1961; 1756 GCT; 47°30'N, 135°00'W; sounding, 2100 fm; wind, 070°, force 2; weather, partly cloudy; sea, moderate; wire angle, 08°.

1	15.65	32.67 7	4.83	386	0	(15.65)	(32.68)	(4.83)	(24.06)	(386)	(0.00)
11	15.60	32.69 7	4.94	383	10	15.61	32.70	4.93	24.09	383	0.04
31	15.62	32.68 0	4.88	385	20	15.60	32.69	4.91	24.08	384	0.08
40	12.44a)	32.69 8	6.00	321	30	15.62	32.68	4.88	24.07	385	0.12
50	9.66	32.71 7	5.98	273	50	9.66	32.72	5.98	25.25	273	0.18
60	8.41	32.74 1	5.66	253	75	7.64	32.75	5.46	25.58	241	0.25
76	7.63	32.74 6	5.45b)	241	100	7.04	32.83	5.42	25.73	227	0.30
110	7.04	32.88 3	5.40	223	125	7.27	33.10	5.24	25.91	210	0.36
145	7.22	33.51 5	4.52	179	150	7.15	33.57	4.32	26.29	174	0.41
210	6.44	33.90 0	2.94	140	200	6.59	33.88	3.04	26.61	143	0.49
273	5.36	33.89 7	2.65	127	250	5.69	33.90	2.77	26.74	131	0.56
372	4.73	33.98 2	1.26	114	300	5.12	33.92	2.37	26.83	123	0.62
486	4.31	34.06 1	0.69	104	400	4.62	34.01	1.11	26.96	111	0.74
605	3.90	34.15 1	0.32	93	500	4.26	34.07	0.63	27.04	103	0.86
741	3.66	34.24 9	0.26	83	600	3.91	34.15	0.33	27.14	93	0.96
889	3.34	34.32 5	0.17	75	700	3.72	34.22	0.27	27.22	86	1.05
1062	3.03	34.39 7	0.19	67	800	3.52	34.29	0.22	27.29	79	1.14
1215	2.81	34.45 4	0.19	60	1000	3.13	34.37	0.18	27.39	69	1.30
					1200	2.83	34.45	0.19	27.48	61	1.45

G HORIZON; September 19, 1961; 1506 GCT; 44°50'N, 135°05'W; sounding, 2139 fm; wind, 300°, force 4; weather, drizzle; sea, rough; wire angle, 25°.

1	16.70	32.75 6	5.00	403	0	(16.70)	(32.76)	(5.00)	(23.89)	(403)	(0.00)
10	16.68	32.75 3	5.08	403	10	16.68	32.75	5.08	23.89	403	0.04
29	15.56	32.77 7	5.37	377	20	16.67	32.76	5.11	23.90	402	0.08
38	11.64	32.79 2	6.02	300	30	14.90	32.78	5.50	24.30	363	0.12
47	10.42	32.79 9	6.16	279	50	10.19	32.80	6.13	25.23	275	0.18
57	9.73	32.81 4	6.02	267	75	8.79	32.83	5.73	25.47	251	0.25
69	9.02	32.82 2	5.80	255	100	8.13	32.87	5.65	25.61	239	0.31
87	8.31	32.85 4	5.66	243	125	7.70	33.10	5.36	25.85	216	0.37
101	8.13	32.87 1	5.65	239	150	8.18	33.48	4.78	26.08	194	0.42
119	7.94	32.91 3	5.64	233	200	8.03	33.92	4.21	26.44	160	0.51
141	8.18	33.39 9	4.91	200	250	7.18	33.94	3.82	26.58	146	0.59
203	8.00	33.93 4	4.19	158	300	6.33	33.94	3.31	26.70	136	0.66
293	6.44	33.93 6	3.42	137	400	5.06	33.96	1.87	26.87	119	0.79
403	5.02	33.95 9	1.83	119	500	4.44	34.06	0.98	27.01	105	0.91
547	4.26	34.11 0	0.71	100	600	4.12	34.17	0.49	27.14	94	1.01
694	3.92	34.23 2	0.30	87	700	3.91	34.24	0.29	27.21	86	1.11
879	3.56	34.34 2	0.22	75	800	3.72	34.30	0.23	27.28	80	1.20
1082	3.10	34.43 3	0.20	64	1000	3.30	34.40	0.21	27.40	69	1.36

a) Mean value of 12.36 and 12.51°C.

b) Alternate value, 5.28 ml/L, not used in interpolation.

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