

UNIVERSITY OF CALIFORNIA    SCRIPPS INSTITUTION OF OCEANOGRAPHY

# data report

## PHYSICAL AND CHEMICAL DATA

GULF CRUISE 7404  
8 April – 5 May 1974

GULF CRUISE 7410  
2 October – 3 November 1974

SIO Reference 88-6  
15 March 1988

UNIVERSITY OF CALIFORNIA  
SCRIPPS INSTITUTION OF OCEANOGRAPHY

PHYSICAL AND CHEMICAL DATA

GULF CRUISE 7404  
8 April – 5 May 1974

and

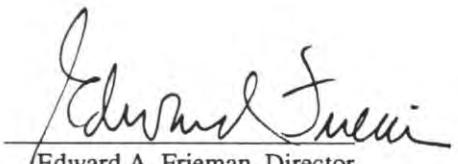
GULF CRUISE 7410  
2 October – 3 November 1974

Sponsored by

Marine Research Committee

SIO Reference 88-6  
15 March 1988

Approved for distribution:



Edward A. Frieman, Director

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## INTRODUCTION

The data in this report were collected during Cruises 7404\* and 7410 in the Gulf of California by the RV *Alexander Agassiz*, of the Scripps Institution of Oceanography, University of California, San Diego. These cruises were a continuation of the cooperative investigation of the biological, chemical, physical and bathymetric parameters in the Gulf of California by the Instituto de Investigaciones Oceanologicas and the Escuela Superior de Ciencias Marinas of the Universidad Autonoma de Baja California (Mexico)\*\*; the Instituto Nacional de Pesca (Mexico); and the Scripps Institution of Oceanography, University of California, San Diego (United States).

These data were collected and processed by personnel of the Data Collection and Processing Group (DCPG\*\*\*, MLRG), Scripps Institution of Oceanography, the Escuela Superior de Ciencias Marinas and Instituto National de Investigaciones Oceanologicos, Universidad Autonoma de Baja California and the Instituto Nacional de Pesca (Mazatlan).

## STANDARD PROCEDURES

The hydrographic casts consisted of 20 or fewer Nansen bottles lowered to varying sampling levels determined mainly by the bottom depths. Multiple lowerings of more than 20 bottles were made on several stations. Temperature, salinity, oxygen and nutrients were determined for all depths sampled.

Paired protected reversing thermometers were used to determine temperatures which are recorded to hundredths of a degree Celsius. Sampling bottles used below a depth of 100 meters were equipped with unprotected thermometers for determination of the depth of sampling. On Cruise 7404 the STD was lowered to 1500 meters, depth permitting, on approximately half the stations. The STD was also used on a few stations on Cruise 7410, but after several malfunctions, its use was discontinued.

Salinity samples from the hydrographic casts were analyzed at sea using inductive-type salinometers. The salinity values are reported to three decimal places. The salinity values tabulated for the STD data for Cruise 7404 are reported in hundredths.

Dissolved oxygen was determined by the Winkler method as modified by Carpenter (1965), using the equipment and procedure outlined by Anderson (1971).

Silicate, phosphate, nitrate and nitrite were determined using a standard Beckman Model DU spectrophotometer. Reactive phosphate was analyzed using the method of Murphy and Riley (1962) with the specific procedure outlined by Anderson (1971), reactive silicate by the method of Strickland and Parsons (1968), nitrate by the method of Wood *et al.* (1967), and nitrite by the method of Bendschneider and Robinson (1952). Nutrient samples for several stations from 7404 were frozen and sent to the Escuela de Ciencias Marinas, Universidad Autonoma de Baja California for analysis.

The observed data have been evaluated using the methodology described by Klein (1973). This involves consideration of their variation as functions of density or depth and their relations to each other, and comparison with adjacent observations.

The STD used on Cruise 7404 operated well. The temperature compared to the hydrographic data required no correction and the salinity values were in good agreement after an offset correction of 0.23‰.

\* The first two digits represent the year and the second two digits the month of the cruise.

\*\* Now the Facultad de Ciencias Marinas.

\*\*\* Now the Oceanographic Data Facility (ODF).

## TABULATED DATA

The time reported is Greenwich Mean Time. For STD lowerings it is the "start down" time and for bottle casts it is the time of messenger release. When more than one cast was lowered on a station, the messenger times for the first and last casts are given. Multiple casts, excluding the surface cast, are indicated by a footnote letter following the observed depth.

Bottom depths, determined acoustically, have been corrected using Matthews (1939) tables and are reported in meters. The weather and dominant waves have been coded using the National Oceanographic Data Center (NODC) method.

Data for all cruises presented in this report were obtained by bottle casts and by the STD, and appear in two forms:

1) Data from the sample bottles appears with the observed levels of depth on the left of a page. Temperature, salinity and oxygen are interpolated from the observations at standard levels of depth on the right of the page. Computed values of thermosteric anomaly (DT) are included with the observed levels and computed values of sigma-t (SIGT), thermosteric anomaly (DT) and geopotential anomaly (DD) are included with the interpolated levels.

2) Data at standard levels of depth from the STD lowerings appear on the right of a page with computed values of sigma-t, thermosteric anomaly and geopotential anomaly included.

The parameters tabulated in this report are the same as those tabulated in CalCOFI reports. The column headings are to be interpreted as follows:

Z	Depth	Meters
T	Temperature	°C
S	Salinity	‰
O2	Dissolved Oxygen	ml/L
PO4	"Reactive" inorganic phosphate-phosphorous	µg at/L
SiO3	"Reactive" inorganic silicate-silicon	µg at/L
NO2	"Reactive" nitrite-nitrogen	µg at/L
NO3	"Reactive" nitrate-nitrogen	µg at/L
DT	$\delta_T$ Thermosteric anomaly	cl/ton
SIGT	$\sigma_t = (\rho_{s,t,0} - 1) \cdot 10^3$ where $\rho_{s,t,0}$ is the density the parcel of sea water would have if moved isothermally to the sea surface.	g/L
DD	Geopotential anomaly, referred to the sea surface.	dyn. meters

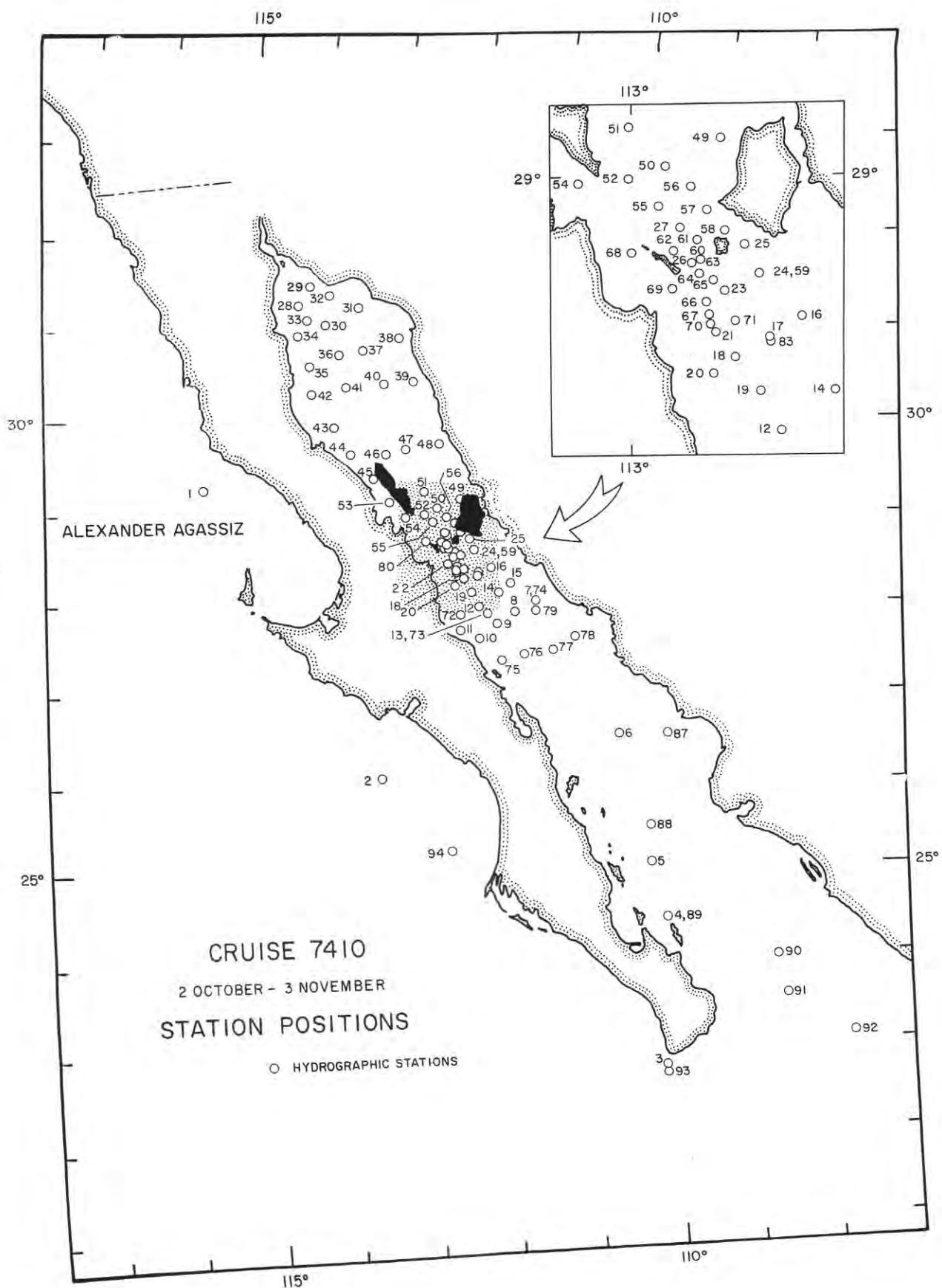
## FOOTNOTES

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

P: After depth value indicates the Nansen bottles posttripped.

U: Uncertain value. Values which are not used in interpolation because they seem to be in error without apparent reason.

V: Because of time differences, overlapping casts show some differences. Values not used in interpolation.



## PERSONNEL

### GULF CRUISE 7410

Schwartzlose, Richard A. (Chief Scientist)	Academic Administrator	SIO
Anderson, George C.	Staff Research Associate	SIO
Baumgartner, Tim	Professor, Marine Geology	UCM, UABC
Crill, Peter A.	Assistant Programmer	SIO
De Master, Dave	Graduate Student	YU
Espinoza, Julio	Student	UCM, UABC
Ferreira, Vincenti P.	Student	UCM, UABC
Garcia, Victor M.	Student	UCM, UABC
Gonzalez, Miguel A.	Technician	INP
Green, Kenneth E.	Graduate Student	WHOI
Hernandez, Rosa M.	Student	UCM, UABC
Kellogg, Durrant	Marine Technician	SIO
Landin, Miguel	Student	UCM, UABC
Lara, Talpa D.	Student	UCM, UABC
Lawver, Lawrence A.	Engineering Aid	SIO
Macias, Vinicio	Student	UCM, UABC
Mead, Richard V.	Marine Technician	SIO
Montaño, Yovani	Student	INP
Moreno, Lorenzo	Student	UCM, UABC
McGoodwin, Jay V.	Student	UO
Ralston, Philip A.	Student	UO
Rosales, Fernando L.	Student	UCM, UABC
Rowe, Raymond A.	Marine Technician	SIO
Saucedo, Marco A.	Student	UCM, UABC
Schmitt, James A.	Electronics Technician	SIO
Taylor, Elliott	Student	UCM, UABC
Velazco, Alfredo	Student	UCM, UABC
Víveros, Enrique A.	Student	UCM, UABC
Williams, David L.	Ph.D.	USGS
Yates, Robert E.	Marine Technician	SIO
Zuck, Richard A.	Technician	WHOI

#### ABBREVIATIONS USED:

INP	Instituto Nacional de Pesca, Mexico, D. F., Mexico
SIO	Scripps Institution of Oceanography, La Jolla, California, USA
UABC	Universidad Autonoma de Baja California,
UCM	Unidad de Ciencias Marinas, Ensenada, Baja California, Mexico
UO	University of Oregon, Charleston, Oregon, USA
USGS	United States Geological Survey
WHOI	Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA
YU	Yale University, New Haven, Connecticut, USA

















RV ALEXANDER AGASSIZ

## GULF CRUISE 7410

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LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
31	28.0 N	114	25.5 W	10/10/74	2200 GMT				21 M	200	08 KT	1	300 01 01			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	29.07	36.072	4.92	0.85	5.4	0.09	0.0	500.2	0	29.07	36.072	4.92	22.866	500.2	0.000	
4	28.75	36.040	5.06	0.87	4.9	0.05	0.0	492.3	10	28.67	36.123	4.56	23.036	483.9	0.049	
8	28.65	36.052	4.74	0.92	5.4	0.08	0.0	488.3								
13	28.74	36.246	4.31	1.22	6.6	0.22	0.0	477.2								
18	28.78	36.342	4.09	1.66	8.2	0.31	0.0	471.6								

RV ALEXANDER AGASSIZ

## GULF CRUISE 7410

30

LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
31	3.0 N	114	12.0 W	10/11/74	0806 GMT				209 M	160	09 KT	0	200 02 04			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	28.08	35.900	4.59	0.73	5.3	0.02	0.1	481.2	0	28.08	35.900	4.59	23.065	481.2	0.000	
10	28.10	35.896	4.60	0.75	5.0	0.02	0.1	482.1	10	28.10	35.896	4.60	23.056	482.1	0.048	
30	26.96	35.764	3.16	1.40	17.1	0.85	4.1	456.2	20	27.67	35.855	3.95	23.166	471.6	0.096	
40	26.13	35.605	2.75	1.61	22.6	0.25	7.3	442.6	30	26.96	35.764	3.16	23.326	456.2	0.142	
51	24.79	35.488	2.30	1.88	28.5	0.11	10.8	411.6	50	24.95	35.498	2.34	23.752	415.6	0.230	
66	20.47	35.319	1.77	2.31	44.1	0.09	16.8	306.3	75	18.85	35.249	1.64	25.269	271.1	0.316	
82	17.96	35.204	1.59	2.54	52.3	0.10	19.1	253.3	100	16.66	35.173	1.51	25.747	225.6	0.379	
102	16.57	35.172	1.51	2.68	57.9	0.07	21.0	223.8	125	15.52	35.142	1.48	25.983	203.2	0.434	
128	15.43	35.139	1.48	2.80	63.9	0.10	22.1	201.4	150	15.00	35.123	1.50	26.085	193.5	0.484	
148	15.02	35.124	1.50	2.84	65.1	0.06	22.8	193.9	200	14.64	35.112	1.68	26.155	186.9	0.582	
177	14.84	35.122	1.50	2.86	65.9	0.11	24.0	190.3								
191	14.73	35.122	1.62	2.82	66.3	0.13	24.0	188.0								
200	14.64	35.112	1.68	2.85	65.6	0.10	24.2	186.9								

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## GULF CRUISE 7410

31

LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
31	13.0 N	113	49.5 W	10/11/74	1100 GMT				26 M	320	04 KT	1	300 01 01			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	28.29	35.905	4.52	0.89	5.2	0.06	0.3	487.4								
11	28.31	35.904	4.57	0.90	5.3	0.05	0.2	488.1								
21	27.97	35.824	3.92	1.19	10.1	0.35	1.1	483.2								

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## GULF CRUISE 7410

32

LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
31	21.0 N	114	10.5 W	10/11/74	1315 GMT				34 M	130	09 KT	0	300 01 01			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	28.52		4.61	0.70	3.9	0.06	0.1		0	28.52		4.61				
10	28.51	36.031	4.65	0.62	3.9	0.04	0.2	485.3	10	28.51		4.65				
20	28.54		4.67	0.62	3.9	0.04	0.1		20	28.54		4.67				
30	28.53		4.63	0.64	4.5	0.06	0.1		30	28.53		4.63				
35	28.53		4.50	0.78	5.6	0.09	0.1									

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## GULF CRUISE 7410

33

LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
31	7.0 N	114	28.5 W	10/11/74	1621 GMT				65 M	360	05 KT	0	170 01 01			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	28.41	36.157	4.48	0.93	6.1	0.12	0.2	473.1	0	28.41	36.157	4.48	23.150	473.1	0.000	
10	28.42	36.136	4.46	0.90	6.0	0.11	0.1	474.9	10	28.42	36.136	4.46	23.130	474.9	0.047	
20	28.42	36.180	4.34	1.05	7.1	0.15	0.1	471.8	20	28.42	36.180	4.34	23.164	471.8	0.095	
30	28.44	36.295	3.90	1.51	12.0	0.68	0.5	464.2	30	28.44	36.295	3.90	23.243	464.2	0.142	
40	28.44	36.356	3.87	1.61	12.8	0.69	0.5	459.8	50	28.42	36.356	3.84	23.296	459.1	0.234	
50	28.42	36.356	3.84	1.70	12.8	0.66	0.5	459.1								
60	28.4	A 36.365	3.86	1.69	12.9	0.65	0.5	457.9								

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## GULF CRUISE 7410

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LATITUDE		LONGITUDE		MO/DAY/YR	MESSENGER TIME				BOTTOM	WIND	SPEED	WEATHER	DOMINANT WAVES			
30	55.5 N	114	33.0 W	10/11/74	1756 GMT				28 M	340	11 KT	0	340 02 03			
Z	T	S	O2	PO4	SI03	N02	N03	DT	Z	T	S	O2	SIGT	DT	DD	
0	28.37	35.866	4.48	0.92	8.3	0.04	0.0	492.7	0	28.37	35.866	4.48	22.944	492.7	0.000	
7	28.35	35.861	4.47	0.94	8.3	0.05	0.0	492.5	10	28.34	35.861	4.44	22.953	491.9	0.049	
13	28.31	35.862	4.42	0.97	8.4	0.05	0.0	491.1	20	28.23	35.854	3.95	22.981	489.2	0.098	
18	28.23	35.853	3.99	1.22	12.3	0.62	0.4	489.2								
23	28.24	35.857	3.89	1.38	13.5	0.79	1.1	489.3								

A) TEMPERATURE INFERRED FROM PRESSURE THERMOMETER AND WIRE DEPTH.















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## GULF CRUISE 7410

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Z	T	S	O2	PO4	SI03	NO2	NO3	DT	DOMINANT WAVES									
									BOTTOM	WIND	SPEED	WEATHER	O	330	02	02	SIGT	DT
									501 M	350	08 KT	0	330	02	02			
0	24.73	35.341	4.37					420.5	0	24.73	35.341	4.37	23.701	420.5	0.000			
10	24.27	35.322	4.12					408.6	10	24.27	35.322	4.12	23.825	408.6	0.041			
30	22.71	35.275	3.55					368.6	20	23.54	35.297	3.83	24.021	390.0	0.081			
40	21.92	35.257	3.34					348.6	30	22.71	35.275	3.55	24.245	368.6	0.119			
49	21.12	35.232	3.17					329.3	50	21.03	35.229	3.14	24.680	327.1	0.189			
64	19.86	35.191	2.79					300.2	75	19.30	35.169	2.63	25.093	287.8	0.267			
79	19.14	35.162	2.59					284.5	100	18.40	35.131	2.30	25.292	268.9	0.337			
99	18.45	35.133	2.31					270.0	125	16.90	35.075	1.95	25.615	238.2	0.401			
129	16.62	35.065	1.90					232.7	150	15.18	34.993	1.64	25.945	206.8	0.458			
160	14.58	34.964	1.53					196.5	200	13.71	34.920	1.31	26.204	182.2	0.558			
200	13.71	34.920	1.31					182.2	250	12.83	34.875	1.09	26.349	168.5	0.649			
250	12.83	34.875	1.09					168.5	300	11.45	34.802	0.74	26.558	148.6	0.731			
300	11.45	34.802	0.74					148.6	400	9.72	34.701	0.40	26.786	127.0	0.877			
350	10.34	34.735	0.54					134.6										
399	9.72	34.701	0.40					127.0										
446	9.34	34.681	0.33					122.5										
495	7.61	34.610	0.22					102.3										

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## GULF CRUISE 7410

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Z	T	S	O2	PO4	SI03	NO2	NO3	DT	DOMINANT WAVES									
									BOTTOM	WIND	SPEED	WEATHER	O	320	02	05		
									288 M	320	08 KT	0	320	02	05			
0	24.01	35.338	4.11					400.1	0	24.01	35.338	4.11	23.914	400.1	0.000			
11	24.04	35.336	4.07					401.1	10	24.04	35.336	4.07	23.905	401.0	0.040			
31	23.51	35.328	3.85					386.8	20	23.91	35.337	4.00	23.943	397.4	0.080			
46	22.44	35.284	3.46					360.6	30	23.56	35.329	3.87	24.041	388.0	0.119			
56	21.10	35.233	2.94					328.7	50	21.95	35.264	3.26	24.452	348.8	0.193			
67	19.32	35.169	2.51					288.4	75	18.82	35.145	2.36	25.196	278.0	0.272			
77A	18.70	35.138	2.32					275.6	100	15.49	35.009	1.65	25.889	212.1	0.334			
89	16.72	35.064	1.93					235.1	125	14.57	34.967	1.48	26.059	195.9	0.386			
110	14.81	34.973	1.49					200.5	150	14.42	34.963	1.45	26.088	193.2	0.436			
126	14.55	34.967	1.48					195.6	200	13.38	34.907	1.24	26.263	176.6	0.531			
155	14.41	34.963	1.44					193.0										
180	14.29	34.960	1.43					190.8										
238	11.66	34.838	0.89					149.7										

RV ALEXANDER AGASSIZ

## GULF CRUISE 7410

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Z	T	S	O2	PO4	SI03	NO2	NO3	DT	DOMINANT WAVES									
									BOTTOM	WIND	SPEED	WEATHER	1	330	02	05		
									297 M	340	09 KT	1	330	02	05			
0	24.36	35.346	4.28					409.5	0	24.36	35.346	4.28	23.816	409.5	0.000			
11	23.39	35.330	3.81					383.3	10	23.48	35.331	3.85	24.065	385.7	0.040			
30	21.11	35.238	3.04					328.7	20	22.32	35.288	3.43	24.366	357.0	0.077			
45	19.75	35.176	2.62					298.5	30	21.11	35.238	3.04	24.664	328.7	0.111			
60	18.17	35.115	2.23					264.7	50	19.19	35.153	2.48	25.107	286.5	0.173			
75	17.33	35.080	2.03					247.7	75	17.33	35.080	2.03	25.515	247.7	0.240			
90	16.14	35.032	1.79					224.6	100	15.11	34.986	1.58	25.956	205.8	0.298			
110	14.21	34.952	1.41					189.8	125	14.03	34.945	1.39	26.157	186.7	0.348			
135	13.91	34.941	1.37					184.6	150	13.71	34.934	1.35	26.216	181.1	0.395			
164	13.44	34.924	1.32					176.6	200	12.18	34.871	1.08	26.473	156.7	0.481			
199	12.20	34.872	1.08					156.9	250	11.63	34.831	0.93	26.547	149.7	0.561			
232	11.81	34.852	0.99					151.3										
265	11.52	34.817	0.88					148.7										
292	11.45	34.817	0.85					147.5										

A) A POSTTRIP MAY HAVE STARTED WITH THIS NANSEN BOTTLE CAUSING THE FOLLOWING DEPTHS TO BE SLIGHTLY UNCERTAIN.















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