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REPORT A

CHEMICAL OCEANOGRAPHIC DATA FROM THE
PERSIAN GULF AND GULF OF OMAN

by

Peter G. Brewer, Alan P. Fleer,
Susan Kadar, Deborah K. Shafer
and Clarence L. Smith

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May 1978

TECHNICAL REPORT

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INTRODUCTION

During February and March of 1977 a major geochemical, biological and geophysical survey of the Persian Gulf and adjacent waters was carried out on R/V ATLANTIS II, Cruise 93, Legs 17 and 18. It is the purpose of this report to present the chemical oceanographic data obtained, together with a documentation of the analytical techniques and a simple discussion of the major features observed. Of the 54 hydrographic stations (ATLANTIS II, Stations 2357-2410) occupied during Leg 17, 45 may be said to be in the Persian Gulf proper, the remainder being in the Gulf of Oman and the northwestern Arabian Sea.

Analytical Techniques

Sampling

Samples were taken with 10 ℓ and 30 ℓ Niskin bottles, with Nansen bottles used intermittently primarily for additional information on the temperature and salinity structure. Temperatures were obtained from reversing thermometers and were corrected on board via the shipboard computer (H.P. 2100) HYLOG program. Salinities were measured using a Schleicher-Bradshaw temperature controlled conductive salinometer. The extreme range of salinity encountered resulted in some loss of precision and salinities are reported to two decimal places at salinities in excess of 39.70 ‰. However, the salinity contrast in the Persian Gulf is so strong that this presents no significant loss in geochemical resolution.

Oxygen

Dissolved oxygen was determined by a modified Winkler titration (Carpenter, 1965).

Phosphate

Dissolved phosphate was determined by the method of Murphy and Riley (1962) using ascorbic acid reduction of the phospho-molybdate complex.

Nitrate and Nitrite

Dissolved nitrate was determined by heterogeneous reduction to nitrite using a cadmium metal column with an ammonium chloride buffer (Morris and Riley, 1963; Grasshoff, 1964). Nitrite was determined by diazotization with sulfanilamide followed by azo dye formation (Bendschneider and Robinson, 1952).

Silicate

Dissolved silicate was determined by metal reduction of the silicomolybdate complex as described by Mullin and Riley (1955).

Alkalinity and Total Carbon Dioxide

A considerable effort was devoted towards obtaining precise and accurate data on the oceanic CO_2 system and examining carbonate chemistry in the Persian Gulf. The technique employed was to carry out an acid titration of the seawater sample in an enclosed and thermostatted vessel and to use Gran plots to determine the $\text{CO}_3^{=}$ - HCO_3^- and HCO_3^- - CO_2 end points (Dyrssen and Sillen, 1968; Edmond, 1970; Hansson and Jagner, 1973). The sample volume used was approximately 180 mls, the titration was carried out at 25°C and the titrant was 0.125 N HCl in 3.8% NaCl. The titration was controlled by a Wang 2200 series micro-computer which activated a motor driven buret (Dosimat E415) and logged the millivolt response of the glass electrode in the titration cell. Data processing was accomplished by a modification of the method of Hansson and Jagner (1973). Calibration of the cell volume was by weight and calibration of the titration procedure was accomplished by titration of a tris-buffer supplied by D. Dyrssen. This tris (tris[hydroxy-methyl]amino-methane) buffer (Hansson, 1973a; Almgren et al., 1975) was subsequently prepared by us and found to be an excellent standard.

The data processing procedure was checked against the GEOSECS system (A. Bainbridge, personal communication). The use of a different computational system generated differences of less than 8 $\mu\text{eq/kg}$ in alkalinity and 8 $\mu\text{moles/kg}$ in total CO_2 . The system functioned well at sea, with virtually no down time. The time required for titration of a single sample, including filling and draining the cell, was about 45 minutes. During the early stages of the cruise a problem was encountered with bubble formation from degassing of deep samples. The bubbles tended to interfere with the electrode, probably affecting the liquid junction, and the deep water data from Stations 2357-2362 are erratic and high.

The precision of the procedure, as determined from replicate and adjacent samples at sea, was $\pm 3 \mu\text{eq/kg}$ in alkalinity and $\pm 10 \mu\text{moles/kg}$ in total CO_2 .

Discussion

The brief discussion given here is intended to serve as an introduction to the data and to the oceanographic setting of the observations. A more rigorous discussion will be found in the various publications resulting from the cruise.

Gulf of Oman and Northeastern Arabian Sea

The northeastern Arabian Sea is characterized by the presence of a strong oxygen minimum which is penetrated by both the Persian Gulf and Red Sea outflows. The oxygen gradient is intense; at Station 2359 a drop of 169 $\mu\text{moles O}_2/\text{kg}$ may be observed in the 25 m depth interval from 98 to 123 meters. Although no zero level of oxygen was detected the residual levels of oxygen ($< 5 \mu\text{m O}_2/\text{kg}$) were sufficiently low for denitrification to occur, and a secondary nitrite maximum may be observed at depths corresponding to that of the Persian Gulf outflow at Stations 2357-2359 and 2363.

The Persian Gulf outflow has been described by Wyrski (1971) as being coincident with the 26.6 σ_θ surface and as lying at depths of between 200 and 350 meters. It is principally characterized by its salinity maximum; however, the volume of this water mass is small and Sharma (1976) points out that its influence on the overall salinity balance of the Arabian Sea is insignificant. Duing and Schwill (1967) have examined the spread of Persian Gulf and Red Sea waters into the Indian Ocean during both the northeast and southwest monsoons. They concluded that the observed distribution of Persian Gulf water could be satisfactorily explained by means of a model which considered only horizontal diffusion and suitable boundary conditions. The incorporation of advective terms did not result in a reasonable fit to the field data. The ATLANTIS II, 93-17 cruise took place during the northeast monsoon. Duing and Schwill (1967) report the southernmost extension of Persian Gulf water to be at approximately 12°N during this monsoonal period, from which one can calculate a crude characteristic spreading time $[L = (KT)^{\frac{1}{2}}]$ of ten to twenty years. More than 50% dilution of the outflow occurs within the Gulf of Oman. Hartmann et al. (1971) gave a salinity of 39.7 ‰ for the outflowing water at the exit of the Persian Gulf. Water of this salinity could not be observed leaving the Gulf on ATLANTIS II, 93-17, the observed value being closer to 37.0 ‰. This may result from seasonal change, or more likely that the outflow is constrained against the western side on passing through the Straits of Hormuz and that Stations 2366 and 2367 were too far to the east to sample the core of the outflow.

Surface values of nutrients are high in the Gulf of Oman due to monsoonal upwelling. Phosphate levels up to 1.00 $\mu\text{m}/\text{kg}$ were detected, together with 8.8 $\mu\text{m NO}_3/\text{kg}$. The consequently high productivity induces a strong oxygen

minimum and in Figure 1 we show dissolved oxygen section through the Gulf of Oman. Water of relatively high oxygen content ($> 180 \mu\text{moles/kg}$) has its oxygen consumed to $< 50 \mu\text{m/kg}$ in the approximately 30 miles between Stations 2366 and 2365.

The Persian Gulf

The hydrographic stations occupied in the Persian Gulf are shown in Figure 2. Although the logistic constraints on the cruise necessitated a complicated steaming pattern, the end result was to provide simple and systematic coverage of the entire area. A hydrographic section (A-A') along the major axis of the gulf provides data on the surface inflow and deep outflow which is complimentary to the 1965 "Meteor" section (Hartmann et al., 1971). In addition, five hydrographic sections across the gulf were made, from section B-B' (Trucial Coast to Hormuz) to F-F' across the outflow from the Shatt al Arab. It was unfortunate that time, and practical difficulties, prevented us from obtaining a section across the true outflow point of the gulf, in the Gulf of Oman. Informal estimates of shipping density there suggest that a ship passes through the Straits of Hormuz every six minutes, posing a distinct hazard to hydrographic work in the area.

The temperature-salinity diagram for Persian Gulf waters is shown in Figure 3. ATLANTIS II, Station 2365 at the left of the diagram clearly shows the T-S maximum associated with the outflowing water in the Gulf of Oman. Surface water of approximately 22°C and $36.5 \text{ }^{\circ}\text{oo}$ salinity enters the Persian Gulf and flows northwards, cooling slightly to $17^{\circ}\text{--}18^{\circ}\text{C}$ and being greatly modified in salinity to $40.5 \text{ }^{\circ}\text{oo}$ as it flows. The cluster of points on the right of the diagram represent deep water leaving the gulf, and the cool, very

high salinity water found on the Arabian shelf. The line of points across the bottom of the diagram represents the intense, but low capacity, signal of low salinity water originating from the Shatt al Arab in the extreme north of the gulf. Observations taken there in late February must represent close to flood conditions for the Tigris and Euphrates Rivers. The fact that no clear connection between Persian Gulf deep water and the T-S maximum at Station 2365 can be seen in the diagram means that intense turbulence must occur in the outflowing water, across the isopycnal surfaces. The map of surface salinity within the gulf (Figure 4) clearly shows the penetration of Gulf of Oman water and its strong tendency to flow northwards along the Iranian coast. The highest salinities observed are in the extensive shallow areas off the Trucial coast. Low salinity water entering through the Shatt al Arab is deflected to the west and influences the waters off Kuwait. The highest salinities to be found in the Persian Gulf proper (and not in isolated brine pools) undoubtedly occur in the Gulfs of Bahrain and Salwa (Sugden, 1963), however, the area is very shallow and contains numerous banks and shoals. Sampling from a large oceanographic vessel in this region was not practical.

The surface distribution of other chemical properties is shown in subsequent figures. Surface temperature (Figure 5) clearly reveals surface inflow of warm Gulf of Oman surface water which progresses, with cooling, up the Iranian coast. In Figure 6 the density (σ_t) distribution of surface waters closely follows the salinity signal and clearly indicates northward flow. The distribution of surface phosphate (Figure 7) shows that high phosphate surface water ($> 1 \mu\text{m/kg}$) from the Gulf of Oman rapidly loses phosphate by mixing and biological stripping as it moves north. Low, but detectable, phosphate concentrations are found

throughout the gulf. No map of surface nitrate concentrations is given. The nitrate concentrations were frequently below detection level and no contours could be drawn. This may be taken as circumstantial evidence for nitrate being a limiting nutrient in the Persian Gulf, during the winter months.

The distribution of surface values of specific alkalinity, here defined as alkalinity ($\mu\text{eq/kg}$)/Cl $^{\circ}/\text{oo}$, is shown in Figure 8. Surface water entering from the Gulf of Oman has typical oceanic values, but loses CaCO_3 due to biological uptake as it moves north. The principal CaCO_3 sink is in the shallow water along the Trucial and Arabian coasts. At the extreme northern end of the gulf very high (> 130) values of specific alkalinity occur. These are associated with river input from the Tigris and Euphrates which is subject to marked seasonal variation.

Sections Across the Gulf

Section B-B' represents the easternmost transect from the Trucial coast to Hormuz Island. Figure 9 presents the salinity, density and dissolved oxygen data. Highest salinities occur at the southern end of the section and in the deepest water. Water of density $\sigma_t = 29.09$ is found at Station 2382 at 15 m depth and Station 2384 at 70 m depth, though continuity along this very steeply sloping surface cannot be established. The most intense oxygen gradient occurs near bottom at Station 2383.

Section C-C' represents the longest and most detailed section. The salinity contrast at the surface is remarkable, ranging from 37.5 $^{\circ}/\text{oo}$ on the Iranian side to 41.2 $^{\circ}/\text{oo}$ on the Arabian coast. Salinities inshore of Station 2372 would undoubtedly have been higher, but time constraints and shallow water prevented further exploration (Figure 10). Figure 11 represents the density

(σ_t) data on this section. All isopycnal surfaces indicate northward flow and the density contrast (σ_t 26.2 to 29.8) is strong. The dissolved oxygen data (Figure 12) reveal an oxygen minimum of 120 $\mu\text{mole O}_2/\text{kg}$ close to the Iranian coast at Station 2381. This was the lowest oxygen concentration encountered within the gulf.

Section D-D', from Quatar to Ra's-e Nay Band on the Iranian coast, reveals a progressive decrease in contrast of hydrographic properties as the gulf waters flow north. The north-south density contrast is σ_t 27.2-29.2 (Figure 13) and salinity contrast 38.2-40.2 ‰, in the surface waters (Figure 14). A front marked, by nearly vertical isopycnal surfaces occurs, at Station 2388 in the center of the gulf. This probably marks the boundary between northward flowing Gulf of Oman water and Arabian coastal water. The oxygen minimum clearly seen on section C-C' is again present in the bottom water close to the Iranian coast, but reduced in intensity to a minimum of 170 $\mu\text{m/kg}$ (Figure 15).

The fourth section, E-E', from Ra's at Tanaqib to just south of Bushehr is consistent with increased uniformity of hydrographic properties. The surface salinity contrast of 39.9 to 40.6 ‰, and density range of 28.9 to 29.5 in σ_t , shows only remnants of the distinction between Gulf of Oman and Arabian coastal waters. Dissolved oxygen levels fall only to 225 $\mu\text{m/kg}$ and no vestige of the oxygen minimum in the deep water adjacent to the Iranian coast can be seen.

The most northerly, and most shallow, section F-F' across the entrance to the Shatt al Arab clearly reveals the influence of river input. Surface salinities range from 39.8 ‰ to 35.7 ‰ and the density structure clearly shows the existence of the less dense ($\sigma_t = 26.0$) water on the Kuwaiti side of the gulf

(Figure 18). Little oxygen depletion occurs in this region.

Sections Along the Major Axis of the Gulf

Section A-A' down the center of the major axis of the gulf, from the Shatt al Arab to the Gulf of Oman, clearly reveals the Mediterranean type circulation with surface inflow and deep outflow. Figure 19 shows a salinity section. The northern water of 40 ‰ cools and flows towards the exit of the gulf, mixing with incoming water in the Straits of Hormuz. The highest salinity bottom water is observed at Station 2368 (41.31 ‰). This water cannot recently originate from the northern end of the gulf, nor were salinities this high observed by Hartmann et al. (1971). A possible origin for this water is in the high salinity region along the Arabian coast, the hypothesis being that dense water formed by evaporation in shallow areas trickles down slope to add to the outflowing waters. This is supported by the section of specific alkalinity (Figure 20) where very low values are recorded for the bottom water at this station. This sample could only have been stripped of its alkalinity in the shallow Arabian coastal areas (c.f. Figure 8). If these concepts are correct then this contribution to the deep outflow is an important new observation. The density section (Figure 21) closely matches the salinity distribution. Dissolved oxygen (Figure 22) shows little consumption within the central trough of the gulf, however, massive consumption occurs in the Gulf of Oman at about the 100 m depth horizon where gulf waters abut the organic rich sediments in the area.

Carbon Dioxide Chemistry Report

The determination of both alkalinity (At) and total carbon dioxide with high precision permits a complete description of the carbon dioxide chemistry of a seawater sample (Dyrssen and Sillen, 1967; Edmond, 1970). The procedure we have used follows that given by Almgren et al. (1977) where the carbonate alkalinity, Ac, is first calculated from

$$Ac = At - [B(OH)_4^-]_t$$

and

$$[B(OH)_4^-]_t = Bt / [1 + 10 \exp (pK_B - pH)].$$

Bt, the total boron concentration, is a function of chlorinity such that

$$Bt/Cl \text{ } ^\circ/_{\text{oo}} = 0.0215 \text{ mM per } ^\circ/_{\text{oo}}.$$

The inter-relationships among the various carbon species are given by

$$[CO_3^{=}]_t = Ac / [2 + 10 \exp (pK_{2c} - pH)]$$

$$[HCO_3^-]_t = [CO_3^{=}]_t 10 \exp (pK_{2c} - pH)$$

$$[CO_2]_t = [HCO_3^-]_t 10 \exp (pK_{1c} - pH)$$

where pK_{1c} , pK_{2c} and pK_B are corrected to the correct salinity and in situ temperature. No pressure corrections were made, and for the shallow waters of the Persian Gulf this omission is insignificant. The calculation of pH, $[CO_2]_t$, $[CO_3^{=}]_t$ and $[HCO_3^-]_t$ from these equations was accomplished by an iterative procedure, stepping in pH and minimizing in $\Delta C_t = C_t \text{ meas.} - C_t \text{ calc.}$

The choice of values for the first and second apparent dissociation constants of carbonic acid is a matter of controversy. A thorough review is given in Skirrow (1975). Takahashi et al. (1976) have carried out an evaluation of

the internal consistency of five sets of apparent dissociation constants of carbonic acid in seawater. He concluded that the apparent dissociation constants of Lyman (1956), Hansson (1973b) and Mehrbach et al. (1973) appeared to be internally consistent with the GEOSECS data, and that on the basis of a statistical analysis of the data in three temperature ranges the dissociation constants of Lyman (1956) and of Mehrbach et al. (1973) appear to be the most satisfactory. However, Almgren et al. (1975) have pointed out that, since within a limited temperature range ΔH for chemical reactions is nearly constant, pK values should be proportional to $1/T$. Hansson's (1973b) constants follow this relationship, but Lyman's (1956) constants do not. Since this report aims for compatibility with the GEOSECS data set we have chosen to use the constants of Mehrbach et al. (1973). These are given by the following expressions:

$$pK_1' = -13.7201 + (0.031334 \times T) + (3235.76/T) + (1.300 \times 10^{-5} \times S \times T) - (0.1032 \times S^{\frac{1}{2}})$$

$$\begin{aligned} pK_2' = & 5371.9645 + (1.671221 \times T) + (0.22913 \times S) + (18.3802 \times \log_{10} S) \\ & - (128375.28/T) - (2194.3055 \times \log_{10} T) - (8.0944 \times 10^{-4} \times S \times T) \\ & - (5617.11 \times \log_{10} S/T) + (2.136 \times S/T) \end{aligned}$$

where S is the salinity in (‰) and T is the temperature in degrees Kelvin.

In addition, the partial pressure of carbon dioxide was calculated from

$$[CO_2]_t = \alpha \cdot pCO_2$$

where α is the solubility of carbon dioxide in seawater. Weiss (1974) gives values for CO_2 solubility in $\text{mol (kg seawater)}^{-1} \text{ atm}^{-1}$ via the equation

$$\ln \alpha = -60.2409 + 93.4517 (100/T) + 23.3585 \ln (T/100) + [0.023517 - 0.023656 (T/100) + 0.0047036 (T/100)^2] S.$$

Independent Check on the Carbon Dioxide Chemistry

The measurements of alkalinity and total carbon dioxide, and the computed properties from these measurements, are subject to error. The precision of the method can be reasonably well established from replicate measurements. The accuracy of the data must be ascertained by other means. One check comes from the carefully defined pH measurements made on this cruise by Dyrssen, using the method of Almgren et al. (1975). The pH scale used by Almgren et al. is defined on the moles per kg. of seawater scale, and is thus different from the activity scale used for pH as calculated from the constants of Mehrbach et al. (1973). The principal difference between the two scales is attributable to complexing of H^+ with $SO_4^{=}$, in the ionic medium of sea water, to form HSO_4^- .

We have taken our alkalinity and total carbon dioxide data and calculated pH on the moles per kg. scale using the constants of Hansson (1973b). These are given by the equations:

$$pK_{1c} = 841/T + 3.272 - 1.01 \times 10^{-2}S + 10^{-4} S^2$$

$$pK_{2c} = 1371/T + 4.854 - 1.935 \times 10^{-2}S + 1.35 \times 10^{-4} S^2$$

The calculated pH was then compared to the measured pH for Stations 2367-2410. The mean difference between pH (meas) and pH (calc.) was 0.009 ± 0.018 pH units. At the alkalinity and total carbon dioxide levels occurring in the Persian Gulf, this is equivalent to an error in total carbon dioxide of 5 ± 10 $\mu\text{m/kg}$, at constant alkalinity, or 5 ± 10 $\mu\text{eq/kg}$ in alkalinity at constant total carbon dioxide. This agreement is remarkably good and lends confidence in the data.

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Figure 1

Figure 2

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

Figure 16

Figure 17

Figure 18

Appendix 1

HYDROGRAPHIC STATION DATA

Note: Starred values (*) indicate erratic total CO₂ concentrations due to bubble formation in the titration cell.

CRUISE AII 93-17

POSITION 22 DEG 21.5'N

66 DEG 23.5'E

DATE 7 FEB 1977

DEPTH 1780 METERS

STATION 2357

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG	
1	23.85	36.218	23.84	24.627	196	3.4	0.57	2.7	0.4	2379	2074	*
29		36.276			199	3.0	0.00	2.8	0.4			
58	23.76	36.435	23.74	24.822	190	2.0	0.61	4.5	0.7	2380	2073	*
73		36.474			191	2.1	0.57	3.7	0.5			
98	23.20	36.486	23.17	25.027	180	3.0	0.80	8.4	0.4	2371	2083	*
124		36.458			179	2.8	0.86	7.2	0.7			
148	21.91	36.193	21.87	25.176	82	8.3	1.55	16.1	0.2	2352	2167	*
172		36.048			20	12.6	2.03		0.0			
197	20.00	36.051	19.96	25.591	5	13.4	2.12	23.6	0.0	2345	2236	*
218	18.62	35.919	18.57	25.847	2	17.0	2.26	23.3	0.0	2344	2283	*
241	17.83	35.950	17.78	26.069	2	19.6	2.22	21.7	0.7	2335	2254	*
259	17.49	36.146	17.44	26.303	2	20.3	2.28	22.6	0.0	2342	2260	*
283		36.218			4	21.6	2.38	22.2	0.0			
325		36.102			1	26.2	2.40	20.9	0.1	2334	2245	*
471		35.776			1	35.0	2.67	24.5	0.3	2335	2288	*
481	12.91	35.770	12.84	27.039	2		2.93	21.8	0.3	2324	2274	*
580	11.91	35.647	11.83	27.142	1		3.00	24.7	0.1	2318	2328	*
675	11.09	35.571	11.00	27.238	1		3.04	28.2	0.0			
772	10.19	35.500	10.09	27.344	1		3.04	30.2	0.0	2378	2432	*
869	9.47	35.434	9.36	27.417	2		3.00	32.8	0.0			
964	8.76	35.370	8.64	27.483	2		3.19	34.9	0.0			
1062	7.96	35.286	7.84	27.541	5		3.29	37.7	0.0			
1154	7.32	35.210	7.19	27.576	11		3.38	37.4	0.0	2483	2549	*
1255	6.82	35.162	6.69	27.609	15		3.33	36.3	0.0			
1348	5.95	35.074	5.81	27.655	28		3.34	38.4	0.0			
1448	5.25	35.008	5.11	27.689	38		3.30	35.0	0.0			
1546		34.954			49		3.30	35.4	0.0	2727	2785	*
1663	4.10	34.928	3.95	27.754	54		3.26	36.1	0.0			
1686	3.99	34.891	3.84	27.736	63		3.08	35.3	0.0			

CRUISE AII 93-17

POSITION 18 DEG 24.6'N 64 DEG 38.2'E

DATE 8 FEB 1977

DEPTH 3457 METERS

STATION 2358

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG	
1	25.19	35.576	25.18	23.738	198	1.3	0.50	2.0	0.1	2384	2056	*
49	25.08	36.602	25.06	24.550	199	1.6	0.53	2.0	0.1			
98	21.63	36.103	21.60	25.183	18	8.4	2.08	23.5	0.1	2342	2212	*
147	19.35	35.944	19.32	25.677	3	12.7	2.42	19.9	0.4			
193	17.30	35.872	17.26	26.136	2	18.5	2.50	19.3	0.4	2328	2259	*
216	16.49	35.952	16.45	26.391	3	19.9	2.57	18.8	0.8	2334	2268	*
243	15.86	35.904	15.82	26.501	3	21.1	2.64	16.0	2.8	2333	2279	*
265	15.41	35.917	15.36	26.613	4	22.5	2.65	15.5	3.2	2336	2279	*
291	14.90	35.976	14.85	26.773	3	22.7	2.66	16.5	3.0			
339	13.70	35.748	13.64	26.856	4	25.4	2.73	19.6	1.7			
381	13.24	35.712	13.18	26.924	2	28.7	2.78	24.5	0.3	2325	2295	*
433	12.73	35.669	12.66	26.995	4	30.0	2.81	24.8	0.0			
481		35.614			3	32.3	2.91	27.4	0.0	2321	2279	*
579	11.41	35.526	11.33	27.141	4	37.5	2.87	25.9	0.0			
718	10.63	35.492	10.53	27.260	4	47.0	2.95	31.1	0.0	2326	2339	*
728		35.490			4	43.9	2.99	31.6	0.0	2319	2318	*
767		35.474			7	49.1	2.94	31.1	0.0			
865	9.64	35.415	9.53	27.374	7	55.2	3.08	32.5	0.0			
961	8.95	35.346	8.83	27.434	8	60.2	3.05	34.3	0.0	2417	2442	*
1202	7.43	35.195	7.30	27.550	16	70.6	3.22	35.2	0.0			
1440		35.056			32	84.2	3.35	38.1	0.0	2418	2506	*
1682	4.47	34.928	4.32	27.716	64	93.7	3.16	36.3	0.0			
1919	3.44	34.830	3.28	27.744	82	102.9	3.10	37.5	0.0			
2158	2.79	34.785	2.62	27.769	97	108.6	2.94		0.0			
2399	2.38	34.756	2.19	27.782	105	114.2	2.90		0.0			
2641	2.10	34.732	1.89	27.786	112	116.6	2.86	35.6	0.0	2382	2386	*
2885	1.90	34.722	1.67	27.795	121	118.0	2.80	33.2	0.0			
3070		34.707			126	119.5	2.82	34.1	0.0			
3262	1.74	34.707	1.48	27.797	131	119.2	2.75	35.7	0.0			
3316	1.74	34.706	1.47	27.797	130	120.9	2.77	35.7	0.0			

CRUISE AII 93-17

STATION 2359

POSITION 17 DEG 51.6'N 60 DEG 45.9'E

DATE 11 FEB 1977

DEPTH 3858 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1		36.268			212	2.2	0.59	3.7	0.4	2330	2011
49	24.68	36.248	24.66	24.404	206	1.7	0.62	4.0	0.4		
74	24.58	36.279	24.56	24.460	197	2.3	0.67	4.0	0.5	2360	2059
98	24.44	36.073	24.41	24.348	190	4.2	0.77	5.3	0.6		
123	21.53	36.078	21.50	25.193	21	9.6	2.09	23.4	0.0	2334	2208
146	20.58	36.026	20.55	25.414	12	11.1	2.25	25.6	0.0		
170	19.43	35.926	19.39	25.643	5	14.0	2.41	25.0	0.0	2329	2235
194	18.12	35.768	18.08	25.856	8	16.7	2.43	24.1	0.0	2319	2236
215	17.14	35.803	17.10	26.123	3	21.0	2.51	18.3	3.1	2331	2257
240	16.47	35.818	16.42	26.294	7	24.7	2.61	16.5	3.2	2326	2263
261	15.80	35.838	15.75	26.464	3	23.0	2.56	18.1	2.4	2333	2271
285	15.26	35.948	15.21	26.672	3	25.2	2.60	19.8	1.0	2330	2270
334	14.45	35.831	14.39	26.761	3	27.0	2.69	23.0	0.3	2332	2280
385	13.52	35.736	13.46	26.885	4	29.0	2.74		0.0		
485		35.644			3	34.0	2.77		0.1		
485	12.77	35.675	12.70	26.993	6	32.1	2.71	27.0	0.0	2321	2281
577	12.10	35.650	12.02	27.107	6	37.2	2.77	25.7	0.0		
673	11.32	35.562	11.23	27.189	6	44.3	2.89	30.7	1.0	2356	2318
720	11.01	35.544	10.91	27.232	7	43.9	2.88	33.7	0.0	2333	2279
772	10.72	35.537	10.61	27.280	7	47.6	2.91	32.2	0.0	2331	2331
961	9.33	35.438	9.21	27.445	9	58.6	3.03	34.0	0.0	2345	2295
1203	7.37	35.224	7.24	27.581	13	73.6	3.20	36.4	0.0		
1440	5.81	35.053	5.67	27.657	34	75.3	3.14	36.9	0.0	2390	2450
1684	4.34	34.931	4.19	27.732	59	94.0	3.08	37.3	0.0		
1922	3.58	34.834	3.42	27.734	82	103.9	3.04	36.7	0.0	2427	2458
2161	2.81	34.784	2.64	27.766	95	109.3	2.94	37.2	0.0	2402	2449
2409	1.90	34.959	1.72	27.981	106	113.7	2.85	35.7	0.0		
2850	1.84	34.716	1.62	27.794	120	117.1	2.89	36.0	0.0	2428	2413
3212	1.77	34.711	1.51	27.798	131	117.1	2.75	36.0	0.0		
3488	1.75	34.704	1.46	27.796	139	118.1	2.78	34.6	0.0	2429	2394

STATION 2360

CRUISE AII 93-17
 POSITION 20 DEG 52.8'N 63 DEG 13'E
 DATE 13 FEB 1977
 DEPTH 3400 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	24.35	36.301	24.34	24.541	215	1.7	0.61	3.4	0.3	2362	2044
1	24.29	36.332	24.28	24.582							
50	24.13	36.391	24.11	24.678	209	1.0	0.66	3.2	0.5		
96	24.21	36.472	24.18	24.718	170	2.7	0.86	5.2	0.7	2368	2079
97	24.19	36.457	24.16	24.713							
120	21.08	35.953	21.05	25.222		10.6	2.19	23.5	0.0	2326	2209
122	21.60	36.084	21.57	25.178							
143	20.38	36.035	20.35	25.475	9	13.1	2.38	25.6	0.0	2307	2194
181	18.38	35.869	18.34	25.868							
195	17.98	35.808	17.94	25.921	4	18.2	2.52	24.2	0.0	2321	2235
218	17.48	35.878	17.44	26.098	5	20.5	2.52	23.5	0.0		
227	16.88	35.827	16.84	26.204							
234	16.57	35.811	16.53	26.265	6	21.9	2.58	23.1	0.0	2324	2246
264		35.885			7	22.0	2.52	23.7	0.0	2325	2249
281	16.13	35.955	16.08	26.479							
291	16.01	35.963	15.96	26.514	8	23.5	2.55	23.8	0.0	2328	2254
313	15.59	36.027	15.53	26.659	5	25.7	2.65	22.9	0.0		
329		36.017									
338	15.16	35.988	15.10	26.727	4	25.4	2.79	22.7	0.0	2333	2258
386	14.15	35.872	14.09	26.858	4	29.8	2.81	22.0	0.0	2323	2271
474	12.96	35.734	12.89	27.000							
483	12.93	35.732	12.86	27.005	5	33.5	2.92	24.4	0.0	2320	2271
579	12.00	35.642	11.92	27.120	3	40.0	3.02	26.6	0.0		

CRUISE AII 93-17

POSITION 20 DEG 52.8'N 63 DEG 13'E

DATE 13 FEB 1977

DEPTH 3400 METERS

STATION 2360

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
673	11.25	35.580	11.16	27.215	4	45.7	3.02	29.0	0.0		
715		35.548									
726	10.81	35.549	10.71	27.272	4	49.7	3.08	29.3	0.0	2332	2303
765	10.58	35.528	10.48	27.298	4	53.1	3.23	29.6	0.0	2326	2312
860		35.456			5	58.0	3.23	32.9	0.0		
948	9.21	35.412	9.09	27.444							
955	9.19	35.405	9.07	27.442	4	63.6	3.30	33.0	0.0	2343	2334
1201	7.55	35.236	7.41	27.565	9	74.1	3.24	38.4			
1420	5.99	35.077	5.85	27.653							
1444	5.95	35.071	5.80	27.654	29	87.1	3.29	39.2		2358	2339
1682	4.42	34.923	4.27	27.717	57	99.8	3.21	36.8			
1895	3.53	34.844	3.37	27.746							
1924	3.46	34.840	3.30	27.750	77	108.6	3.10	37.3		2405	2375
2161	2.82	34.784	2.65	27.765	93	101.2	3.01	37.8			
2390	2.38	34.757	2.19	27.782							
2398	2.36	34.753	2.17	27.781	107	116.3	2.94	37.6		2420	2323
2639	2.03	34.729	1.82	27.789	113	120.7	2.90	36.5			
2867	1.86	34.716	1.64	27.793							
2877	1.88	34.716	1.65	27.792	120	122.0	2.80	36.6		2424	2355
3170		34.707			121	123.2	2.80	38.2			
3251	1.75	34.707	1.49	27.796							
3261	1.75				128	120.9	2.71	36.3		2423	2394

STATION 2361

CRUISE AII 93-17
 POSITION 21 DEG 52.2'N 62 DEG 11.0'E
 DATE 13 FEB 1977
 DEPTH 3300 METERS

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	23.65	36.379	23.64	24.808	206						
98	23.31	36.440	23.28	24.960	152						
148	21.99	36.255	21.95	25.201	45						
197	20.35	36.155	20.31	25.577	14						
243	18.98	36.132	18.93	25.920	7						
268		36.168			5						
294		36.346			10						
344		36.364			11						
392		36.250			10						
490		35.975			5						

STATION 2362

CRUISE AII 93-17
 POSITION 22 DEG 48'N 62 DEG 05'E
 DATE 14 FEB 1977
 DEPTH 2852 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	23.75	36.386	23.74	24.784	202	2.3	0.70	5.4	0.8	2359	2071
98	23.22	36.374	23.19	24.936	140	3.6	1.12	11.9	0.1		
123	22.16	36.268	22.13	25.161	62	7.2	1.79	18.7	0.0	2344	2179
194	19.69	36.136	19.65	25.737	8	14.8	2.34	23.2	0.0	2333	2232
243	18.33	36.130	18.28	26.083	7	18.4	2.40	22.3	0.0	2331	2242
289	17.18	36.156	17.12	26.387	7	21.2	2.48	21.6	0.0	2335	2254
317	16.60	36.166	16.54	26.533	7	22.2	2.47	21.6	0.0	2332	2258
332	16.41	36.216	16.35	26.617	7	24.1	2.47	21.6	0.0	2339	2262
378		36.138			6	24.7	2.52	22.8	0.0	2334	2266
424	14.72	36.038	14.65	26.865	5	28.8		22.8	0.0		
469	14.00	35.943	13.92	26.948	4	30.8		24.6	0.0	2334	2275
565	12.77	35.784	12.68	27.080	4	35.9	2.77	24.8	0.0		
658	12.23	35.690	12.13	27.116	4	38.9	2.85	25.3	0.0	2328	2279
753	11.04	35.570	10.94	27.248	4	48.0	2.98	29.2	0.0		
845	10.24	35.512	10.13	27.347	4	53.5	3.01	31.2	0.0		
938	9.67	35.458	9.55	27.404	5	57.9	3.10	31.5	0.0		
1411	6.50	35.128	6.35	27.627	20	79.4	3.28	37.8	0.0		
1877	3.77	34.868	3.61	27.742	66	103.7	3.19	37.2	0.0		
2350		34.772			101	112.7	2.98	37.0	0.0		
2538	2.14	34.739	1.94	27.788	107	117.5	2.88	36.7	0.0		

STATION 2363

CRUISE AII 93-17

POSITION 23 DEG 30.0'N 60 DEG 45.0'E

DATE 15 FEB 1977

DEPTH 3347 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.84	36.536	22.83	25.163	222		0.86		0.0		
97		36.089			5		2.47		0.0		
111	18.39	36.081	18.36	26.024	3	18.1	2.50	22.6	0.0	2332	2243
126	18.12	36.169	18.09	26.160	3		2.50		0.3		
170	17.47	36.376	17.44	26.480	7		2.40		0.0		
195	17.07	36.411	17.03	26.605	6	20.7	2.42	21.3	0.0	2343	2257
244	15.47				3		2.71				
289	14.05	35.974	14.00	26.955	3	30.8	2.84	21.0	0.4	2334	2275
314	13.43	35.880	13.38	27.013	3		2.65				
340	13.04	35.809	12.99	27.038	4	35.0	2.77	23.7	0.0	2331	2271
365	12.69	35.757	12.63	27.069	3	35.7	2.77	24.1		2330	2272
387	12.53	35.732	12.47	27.082	3	37.3	2.84	24.0		2330	2277
434	12.04	35.671	11.98	27.131	4		2.88				
485	11.62	35.615	11.55	27.169	3	37.3	2.89	24.5		2326	2279
530	11.32	35.596	11.24	27.211	5		2.93				
574	11.03	35.567	10.95	27.243	2	43.3	2.99	28.4		2325	2286
674	10.30	35.519	10.21	27.338	4		3.00				
772		35.459			4	48.1	3.10	33.1		2348	2315
870	9.09	35.418	8.98	27.466	3		3.12				
968	8.44	35.335	8.32	27.506	5	67.0	3.18	35.5		2346	2331

STATION 2364

CRUISE AII 93-17
 POSITION 24 DEG 15'N 59 DEG 30'E
 DATE 15 FEB 1977
 DEPTH 3213 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	23.28	36.415	23.28	24.943	189	2.0	0.78	2.8	0.1	2367	2081
96	23.25	36.415	23.23	24.956		2.1	0.85				
121	23.23	36.411	23.20	24.962		2.1	0.83				
145	21.40	36.172	21.37	25.300	22	10.3	2.14	23.3	0.0	2336	2210
195	19.40	36.034	19.36	25.734		14.9	2.40				
243	17.85	35.996	17.81	26.098	27	19.2	2.51	20.8	0.0	2328	2238
291	17.47	36.161	17.42	26.320		20.9	2.44				
338	16.31	36.235	16.25	26.655	8	23.0	2.49	21.0	0.0	2336	2259
384	14.96	36.056	14.90	26.824	14	26.8	2.54	22.2	0.0	2334	2267
434	13.92	35.900	13.85	26.930		30.3	2.76				
486	13.37	35.837	13.30	26.996	4	32.8	2.83	22.5	0.0	2327	2271
527	12.96	35.781	12.88	27.038		35.6	2.75				
574	12.46	35.709	12.37	27.083		37.6	2.78				
622	12.12	35.670	12.03	27.120		40.1	2.89				
671	11.67	35.621	11.57	27.169	3	43.2	2.98	24.7	0.0	2327	2280
713	11.36	35.590	11.26	27.204			2.96				
758	11.14	35.568	11.03	27.228	5	48.2	2.99	27.5	0.0	2328	2293
818	10.74	35.545	10.63	27.284		50.9	3.04				
860		35.519			3	54.2	3.12	29.6	0.0	2335	2305
950	9.77	35.464	9.65	27.392	4	59.1	3.13	31.7	0.0	2331	2302

CRUISE AII 93-17

POSITION 25 DEG 2.6'N 57 DEG 46.0'E

DATE 16 FEB 1977

DEPTH 1097 METERS

STATION 2365

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.74	36.438	22.73	25.118	183	2.8	1.00	8.8		2365	2099
1		36.440									
96	22.77	36.436	22.74	25.113	189	2.3	0.99	9.5			
97	22.74	36.439	22.71	25.124							
121	22.76	36.434	22.73	25.116	182	2.3	1.00	7.9		2363	2089
145	22.54	36.404	22.50	25.158	156	4.4	1.21	11.6			
191	20.02	36.113	19.98	25.632							
195	20.03	36.114	19.99	25.631	5	14.0	2.39	23.3		2331	2234
243	18.86	36.208	18.81	26.009	9	16.9	2.37	21.3			
285	18.86	36.506	18.80	26.238							
291	19.21	36.881	19.15	26.435	48	15.3	2.00	17.0		2362	2223
315	17.41	36.530	17.35	26.619	19	20.8	2.37	19.9			
338	16.67	36.412	16.61	26.707	10	24.2	2.45	20.6		2347	2255
360	16.40	36.420	16.33	26.777	13	23.3	2.46	20.8			
380	16.12	36.358	16.05	26.795							
384	15.78	36.315	15.71	26.840	9	25.8	2.53	21.4		2347	2267
434	14.83	36.183	14.76	26.953	10	28.9	2.56	21.9			
467	13.73	35.972	13.65	27.027							
486	13.60	35.958	13.52	27.043	6	33.0	2.78	22.4		2336	2269
531	12.87	35.826	12.79	27.091	7	36.8	2.81	24.0			
564	12.13	35.702	12.05	27.142							
573	12.14	35.700	12.06	27.138	4	40.7	2.92	25.2		2330	2284
625	11.38	35.613	11.29	27.216	5	46.3	2.97	27.1			
669	10.94	35.566	10.85	27.261							
679					4	50.5	2.96	27.8			
762	10.19	35.502	10.09	27.346							
772		35.492			5	56.3	3.39	30.2		2338	2291
866	9.73	35.422	9.62	27.364	4	61.9	3.17	32.2			
950	8.87	35.374	8.75	27.469							
960	8.82	35.372	8.70	27.475	6	64.9	3.22	33.2		2348	2329

CRUISE AII 93-17
 POSITION 25 DEG 30'N 57 DEG 0'E
 DATE 16 FEB 1977
 DEPTH 160 METERS

STATION 2366

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
10	22.61	36.434	22.60	25.152	215	1.4	0.60	9.4	0.6	2328	2032
19	22.60	36.436	22.59	25.157							
25	22.55	36.436	22.54	25.172	205	1.4	0.66	9.9	0.7		
34	22.57	36.436	22.56	25.167	205	1.4	0.64	9.7	0.7		
34	22.59	36.436	22.58	25.161							
45	22.58	36.440	22.57	25.168							
55	22.58	36.436	22.56	25.165	203	1.7	0.61	9.8	0.7	2326	2043
69	22.50	36.450	22.48	25.200							
76	22.43	36.466	22.41	25.232	192	2.3	0.78	13.7	1.0		
94	22.36	36.460	22.34	25.249							
106	22.02	36.412	21.99	25.309	142	4.8	1.11	23.7	1.0	2315	2092
115	20.77	36.171	20.74	25.472	12	11.7	2.09	46.8	0.1		
118	21.77	36.320	21.74	25.310							
121	20.26	36.411	20.23	25.792	25	12.8	2.05	38.7	0.1	2296	2177
126	20.38	36.156	20.35	25.566							
131		36.874			63	9.6	1.67	32.0	0.2		
132	20.46	36.350	20.43	25.692							
141	21.28	37.286	21.25	26.182	95	7.3	1.34	23.3	0.5	2304	2106
141		37.995									
150	21.13	39.300	21.09	27.758							

CRUISE AII 93-17

POSITION 26 DEG 34.4'N 56 DEG 40.0'E

DATE 16 FEB 1977

DEPTH 68 METERS

STATION 2367

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.16	36.602	22.15	25.408	231	0.9	0.38	0.9	0.2	2387	2067
9	22.15	36.599	22.14	25.409	229	0.9	0.43	1.2	0.2		
20	22.11	36.599	22.10	25.421	222	1.1	0.47	1.0	0.3	2385	2077
28	22.07	36.611	22.06	25.441	211	1.6	0.63	1.9	0.5		
34	22.06	36.628	22.05	25.458	203	2.0	0.63	2.9	0.6	2388	2093
39	22.03	36.692	22.02	25.515	202	2.2	0.61	2.4	0.6		
49	21.74	36.720	21.72	25.618	211	1.6	0.45	0.9	0.5	2389	2085
53	21.69	36.725	21.67	25.636	205	2.1	0.54	1.2	0.7		
56		36.778			192	2.9	0.66	1.6	1.1		
60	21.56	36.778	21.54	25.713	195	2.8	0.69	1.5	1.1	2403	2113

STATION 2368

CRUISE AII 93-17
 POSITION 26 DEG 05.0'N 54 DEG 54.0'E
 DATE 17 FEB 1977
 DEPTH 81 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.51	37.168	21.51	26.018	231	0.6	0.38	0.2	0.0	2402	2069
10	21.05	37.204	21.05	26.175	233	0.5	0.38	0.0	0.0	2396	2059
20	21.70	37.750	21.70	26.409	203	1.1	0.46	0.5	0.3	2408	2104
29	21.65	38.410	21.64	26.928	183	2.0	0.59	2.0	0.9	2429	2124
38	21.60	39.182	21.59	27.528	167	2.8	0.60	3.6	1.0	2441	2142
48	20.98	39.83	20.97	28.198	181	2.1	0.40	1.3	0.6	2458	2137
53	20.87	39.98	20.86	28.342	181	2.1	0.37	1.3	0.6	2461	2140
57	20.64	40.21	20.63	28.581	185	2.3	0.34	0.8	0.6	2472	2141
67		41.00			189	2.4	0.25	0.7	0.4	2477	2142
76	19.54	41.31	19.52	29.726	198	2.7	0.23	0.2	0.2	2468	2133

STATION 2369

CRUISE AII 93-17
 POSITION 26 DEG 02.5'N 54 DEG 27.0'E
 DATE 17 FEB 1977
 DEPTH 86 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.57	37.847	21.57	26.519							
9	21.29	37.874	21.29	26.619							
20	21.36	38.038	21.35	26.725							
29	21.45	38.692	21.44	27.197							
39	21.57	39.377	21.56	27.686							
48	21.39	39.81	21.38	28.069							
58	21.25	39.92	21.24	28.191							
68		40.15									
73		40.34									
78	20.26	40.35	20.24	28.795							

STATION 2370

CRUISE AII 93-17
 POSITION 26 DEG 10.7'N 53 DEG 38.8'E
 DATE 17 FEB 1977
 DEPTH 78 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.62	37.958	21.62	26.588	222						
10	21.26	37.962	21.26	26.692	223						
20	21.42	38.944	21.42	27.397	201						
29	21.16	39.504	21.16	27.896	206						
39	20.43	39.76	20.42	28.295	209						
44	20.46	39.94	20.45	28.424	191						
48	20.34	40.04	20.33	28.534	182						
58	19.92	40.12	19.90	28.711	187						
68		40.12			184						
73	19.86	40.13	19.84	28.735	189						

STATION 2371

CRUISE A II-93-17
 POSITION 26DEG 15.0'N 52DEG 54.0'E
 DATE 17 FEB 1977
 DEPTH 70 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.99	38.895	20.99	27.478	220	1.7	0.31	0.0	0.0	2453	2119
10	20.32	39.092	20.32	27.813	222	1.3	0.25	0.0	0.0		
20	20.29	39.538	20.28	28.163	220	1.1	0.27	0.0	0.1	2483	2134
29	20.24	39.658	20.23	28.270	218	0.9	0.31	0.0	0.1		
34	20.16	39.653	20.16	28.286	215	1.4	0.35	0.2	0.5		
39	20.06	39.78	20.06	28.410	194	3.6	0.53	0.8	1.8	2491	2168
44	19.81	39.83	19.80	28.517	191	4.3	0.55	0.5	2.1		
49	19.81	39.84	19.80	28.525	187	4.5	0.58	0.7	2.1	2494	2174
59		39.90			185	5.5	0.61	0.8	2.2		
68	19.73	39.92	19.71	28.610	180	5.8	0.63	0.8	2.3	2499	2185

CRUISE A II-93-17

POSITION 24DEG 56.0'N 53DEG 09.7'E

DATE 18 FEB 1977

DEPTH 17 METERS

STATION 2372

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	19.51	40.38	19.51	29.017	223	0.7	0.14	0.0	0.0	2500	2152
5	19.27	40.72	19.27	29.340	224	0.6	0.10	0.0	0.0	2493	2138
10	18.93	41.16	18.93	29.768	225	0.7	0.00	0.0	0.0	2483	2132
15	18.88	41.27	18.87	29.868	223	0.6	0.00	0.0	0.0	2483	2133

CRUISE AII 93-17

STATION 2373

POSITION 25 DEG 2.0'N 53 DEG 17.6'E

DATE 18 FEB 1977

DEPTH 18 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.11	39.87	20.11	28.465							
5	20.02	39.91	20.02	28.519	221						
10	19.19	40.54	19.19	29.225	226						
15	18.86	40.75	18.85	29.473	222						

CRUISE AII 93-17

POSITION 25 DEG 10.2'N 53 DEG 24.7'E

DATE 18 FEB 1977

DEPTH 21 METERS

STATION 2374

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.52	39.71	20.52	28.230	219	1.2	0.24	0.0	0.0	2483	2130
5	20.33	39.71	20.33	28.282	219	0.2		0.0	0.0		
10	19.80	40.08	19.80	28.709	223	0.0	0.17	0.0	0.0	2499	2138
15	19.62	40.12	19.62	28.787	222	0.0	0.15	0.0	0.0		
20	19.57	40.12	19.56	28.803	223	0.0	0.18	0.0	0.0	2496	2139

CRUISE AII 93-17

POSITION 25 DEG 15.5'N 53 DEG 29.3'E

DATE 18 FEB 1977

DEPTH 21.9 METERS

STATION 2375

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	O/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	20.89	39.50	20.89	27.968	244						
5	20.62	39.54	20.62	28.073	221						
10	20.23	39.71	20.23	28.309	233						
15	19.82	39.91	19.81	28.575	219						
20	19.77	39.95	19.77	28.618	222						

STATION 2376

CRUISE AII 93-17
 POSITION 25 DEG 25.6'N 53 DEG 58.5'E
 DATE 18 FEB 1977
 DEPTH 37 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.10	39.09	21.09	27.598	215	1.3	0.35	0.0	0.0	2465	2111
10	20.40	39.54	20.39	28.134	222	1.4	0.24	0.0	0.0		
20	19.80	39.87	19.80	28.548	219	1.3	0.22	0.0	0.0	2531	2168
30	19.61	40.00	19.61	28.700	217	1.4	0.24	0.0	0.0		
35	19.59	40.04	19.59	28.735	217	1.4	0.22	0.0	0.0	2501	2154

STATION 2377

CRUISE AII 93-17
 POSITION 25 DEG 38.2'N 53 DEG 48.3'E
 DATE 18 FEB 1977
 DEPTH 50 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.50	38.73	21.49	27.212	219						
10	20.71	39.05	20.71	27.675	221						
20	20.17	39.83	20.17	28.418	208						
30	20.07	39.87	20.07	28.476	205						
40	19.96	39.91	19.95	28.537	204						
50	19.94	39.91	19.93	28.543	204						

CRUISE A II-93/17

POSITION 25 DEG 48.8'N 53 DEG 57.5'E

DATE 18 FEB 1977

DEPTH 62 METERS

STATION 2378

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.25	38.25	21.25	26.915	223	0.7	0.38	0.0	0.0	2440	2098
10	20.77	38.89	20.77	27.536	222	0.9	1.00	0.0	0.0		
20	20.69	39.21	20.68	27.804	218	1.3	0.50	0.0	0.0		
30	20.60	39.66	20.59	28.171	217	1.1	0.39	0.0	0.8	2499	2156
40	20.27	39.86	20.26	28.416	217	1.5	0.33	0.3	0.7		
50	20.00	40.00	19.99	28.596	194	1.9	0.31	0.1	0.7		
60	19.97	40.01	19.95	28.614	194	2.2	0.35	0.1	0.6	2503	2161

CRUISE AII 93-17

POSITION 25 DEG 58.5'N 54 DEG 8.0'E

DATE 18 FEB 1977

DEPTH 75 METERS

STATION 2379

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.94	37.795	21.94	26.375	224						
10	21.05	38.904	21.05	27.469	221						
20	21.26	39.587	21.25	27.932	203						
30	20.54	39.72	20.53	28.234	210						
40	20.35	39.83	20.34	28.371	205						
50		39.88			199						
60		39.92			201						
70		39.98			193						

CRUISE AII 93-17

POSITION 26 DEG 8.3'N 54 DEG 15.2'E

DATE 18 FEB 1977

DEPTH 87 METERS

STATION 2380

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.02	37.958	22.02	26.475	220	0.6	0.46	0.0	0.0	2431	2087
15	21.54	37.972	21.54	26.622	220	0.6	0.42	0.0	0.0		
30	21.57	39.182	21.56	27.537	178	1.4	0.52	1.0	1.0		
44	21.73	39.73	21.72	27.910	165	3.5	0.56	3.8	0.2		
59	21.05	40.06	21.03	28.355	162	2.6	0.55	3.9	0.1	2491	2178
74	20.55	40.03	20.54	28.469	180	2.7	0.53	1.6	0.8		
83	20.54	40.02	20.53	28.465	178	2.7	0.53	1.6	0.8	2501	2171

CRUISE AII-93/17

POSITION 26 DEG 17.2'N 54 DEG 24.0'E

DATE 18 FEB 1977

DEPTH 60 METERS

STATION 2381

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.87	37.480	21.87	26.156	228						
10	21.50	37.709	21.49	26.434	224						
20	21.39	37.876	21.39	26.592	223						
30	21.18	38.302	21.17	26.976	208						
40	21.71	39.424	21.71	27.681	145						
50	21.93	39.78	21.92	27.890	119						
59	21.42	40.07	21.41	28.258	146						

CRUISE AII 93-17
 STATION 2382
 POSITION 25 DEG 30.9'N 55 DEG 24.4'E
 DATE 19 FEB 1977
 DEPTH 18 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.49	37.727	21.49	26.450	224	0.5	0.34	0.4	0.1	2446	2097
5	21.32	38.921	21.32	27.407	220	0.8	0.18	0.0	0.0		
10	20.74	40.14	20.74	28.497	219	0.4	0.14	0.0	0.0	2462	2111
15	20.24	40.74	20.24	29.094	215	0.7	0.11	0.0	0.0	2462	2119

CRUISE AII 93-17

POSITION 25 DEG 42.0'N 55 DEG 19.8'E

DATE 19 FEB 1977

DEPTH 26 METERS

STATION 2383

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	21.98	36.928	21.98	25.705	235						
5	21.90	36.925	21.90	25.726	237						
10	21.84	36.938	21.83	25.754	234						
15	21.88	37.250	21.88	25.978	240						
20	21.68	37.489	21.68	26.216	230						
25	21.54	38.973	21.54	27.385	173						

CRUISE AII 93-17

POSITION 25 DEG 57.4'N 55 DEG 19.9'E

DATE 19 FEB 1977

DEPTH 75 METERS

STATION 2384

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.28	36.987	22.28	25.664	237	0.5	0.43	0.0	0.0	2391	2045
1		36.859									
10	21.81	36.982	21.81	25.794	239	0.5	0.43	0.0	0.0		
20	21.76	37.033	21.75	25.848							
20	21.72	37.091	21.71	25.903	235	0.5	0.42	0.0	0.0		
30	21.66	37.358	21.65	26.123	214	0.7	0.55	0.7	0.6	2417	2098
40	21.40	38.172	21.39	26.817							
40	21.40	38.197	21.39	26.836	196	1.6	0.56	1.8	0.6		
50	21.14	39.78	21.13	28.114	172	1.9	0.53	1.9	1.0		
59	20.43	40.42	20.41	28.802	182	2.1	0.43	1.2	1.0		
69	20.08	40.67	20.07	29.087	189	2.1	0.51	0.7	0.7	2469	2140
69	20.09	40.67	20.08	29.085							

CRUISE AII 93/17

POSITION 26 DEG 14.8'N 55 DEG 11.5'E

DATE 19 FEB 1977

DEPTH 73 METERS

STATION 2385

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	22.48	36.859	22.48	25.510	237	1.1	0.47	0.4	0.1	2390	2052
10	21.75	37.098	21.75	25.899	225	1.1	0.49	0.4	0.3		
20	21.72	37.206	21.71	25.992	222	1.1	0.51	0.1	0.3		
30	21.56	37.612	21.55	26.346	210	1.2	0.56	0.8	0.6		
40	21.51	37.847	21.50	26.539	202	1.5	0.55	1.2	0.8	2409	2093
50	21.26	38.908	21.25	27.416	176	2.6	0.59	2.8	0.9		
60	20.42	39.447	20.41	28.059	169	3.1	0.59	3.6	0.7		
70	20.93	40.08	20.92	28.402	169	3.5	0.57	3.7	0.6	2460	2149

STATION 2386

CRUISE AII 93-17
 POSITION 26 DEG 2.0'N 51 DEG 37.2'E
 DATE 20 FEB 1977
 DEPTH 16 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	19.62	40.12	19.62	28.789	226					2548	2176
5	19.59	40.12	19.59	28.796	229						
10	19.46	40.15	19.46	28.854	232					2536	2174
15	19.08	40.51	19.08	29.230	231					2530	2175

CRUISE AII 93/17

POSITION 26 DEG 21.0'N 51 DEG 58.0'E

DATE 20 FEB 1977

DEPTH 32 METERS

STATION 2387

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.42	39.469	20.42	28.073	251	0.2	0.29	0.0	0.0	2486	2155
10	20.22	39.537	20.22	28.180	226	0.1	0.29	0.0	0.0		
20	19.13	40.12	19.13	28.919	222	0.1	0.20	0.0	0.0		
30	18.88	40.27	18.87	29.101	222	0.1	0.20	0.0	0.0	2515	2177

CRUISE AII 93/17

POSITION 26 DEG 34.7'N 51 DEG 59.5'E

DATE 20 FEB 1977

DEPTH 57 METERS

STATION 2388

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG	- 69 -
1	20.33	39.466	20.33	28.096	227					2496	2152	
10	20.35	39.466	20.34	28.092	226							
20	19.79	39.609	19.78	28.353	227					2513	2176	
30	19.67	39.632	19.66	28.403	224							
40	19.42	39.74	19.41	28.553	217					2513	2177	
50	19.28	39.90	19.27	28.711	212							

STATION 2389

CRUISE AII 93/17

POSITION 26 DEG 49.0'N 52 DEG 10.7'E

DATE 20 FEB 1977

DEPTH 60 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.42	38.915	20.42	27.649	229	0.2	0.30	0.0	0.0	2467	2125
10	20.45	38.920	20.45	27.645	228	0.3	0.33	0.0	0.0		
20	20.41	38.936	20.41	27.670	228	0.2	0.31	0.0	0.0	2473	2125
30	20.26	39.091	20.25	27.830	220	0.2	0.38	0.0	0.2		
40	20.27	39.205	20.26	27.915	213	0.3	0.44	0.2	0.7		
50		39.440			202	0.3	0.53	0.7	1.4		
60		39.72			199					2508	2191

STATION 2390

CRUISE AII 93/17
 POSITION 27 DEG 5.0'N 52 DEG 21.5'E
 DATE 20 FEB 1977
 DEPTH 73 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.87	38.788	20.87	27.429	222	0.2	0.37	0.0	0.0	2453	2108
10	20.91	38.784	20.91	27.416	222	0.2	0.37	0.0	0.0		
20	20.92	38.805	20.91	27.431	222	0.1	0.38	0.2	0.0	2461	2116
30	20.50	39.127	20.49	27.792	219	0.1	0.45	0.0	0.0		
40	20.49	39.380	20.48	27.987	210	0.1	0.43	0.0	0.9		
50	20.52	39.644	20.51	28.182	204	0.1	0.44	1.0	0.8	2486	2146
60		39.74			188	0.4	0.59	2.6	0.2		
70	20.33	39.85	20.32	28.392	174	0.5	0.71	3.2	0.4	2499	2185

CRUISE AII 93/17
 POSITION 27 DEG 21.5'N 52 DEG 33.8'E
 DATE 20 FEB 1977
 DEPTH 44 METERS

STATION 2391

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	20.46	38.197	20.46	27.091	231					2442	2088
10	20.62	38.348	20.62	27.164	231						
20	20.55	38.737	20.55	27.479	228					2459	2114
30	20.50	39.027	20.49	27.716	199						
40	20.69	39.201	20.68	27.797	166					2489	2189

STATION 2392

CRUISE AII 93/17
 POSITION 28 DEG 30.0'N 51 DEG 0.0'E
 DATE 21 FEB 1977
 DEPTH 14 METERS

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	18.57	39.91	18.57	28.904	232					2516	2154
5	18.64	39.91	18.64	28.885	236					2521	2162
10	17.98	39.91	17.98	29.056	235					2528	2172

STATION 2393

CRUISE AII 93/17
POSITION 28 DEG 21.5'N 50 DEG 38.6'E
DATE 21 FEB 1977
DEPTH 53 METERS

DEPTH M	TEMP DEG C	SALINITY	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.40	39.90	18.40	28.939	239	0.0	0.11	0.0	0.0	2518	2160
10	18.28	39.91	18.28	28.978	235	0.0	0.11	0.0	0.0		
20	17.89	40.03	17.88	29.171	232	0.0	0.13	0.0	0.0		
30	17.88	40.06	17.87	29.198	230	0.0	0.29	0.0	0.0	2524	2165
40	17.86	40.06	17.86	29.201	226	0.0	0.29	0.0	0.0		
50	17.89	40.07	17.88	29.203	225	0.0	0.29	0.0	0.0	2534	2175

STATION 2394

CRUISE AII 93/17
 POSITION 28 DEG 12.8'N 50 DEG 27.8'E
 DATE 21 FEB 1977
 DEPTH 55 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.71	40.26	18.71	29.136	233	0.1	0.16	0.0	0.1	2543	2179
10	18.67	40.26	18.67	29.146	229	0.1	0.17	0.0	0.0		
20	18.51	40.24	18.51	29.172	227	0.1	0.17	0.0	0.0	2546	2182
30	18.51	40.24	18.50	29.174	227	0.1	0.17	0.0	0.0		
40	18.49	40.24	18.48	29.180	227	0.1	0.17	0.0	0.0		
50	18.44	40.24	18.43	29.192	226	0.1	0.14	0.0	0.0	2541	2180

STATION 2395

CRUISE AII 93-17
POSITION 28 DEG 4.0'N 50 DEG 12.7'E
DATE 22 FEB 1977
DEPTH 55 METERS

[illegible]

STATION 2396

CRUISE AII 93/17
 POSITION 27 DEG 54.7'N 49 DEG 58.5'E
 DATE 22 FEB 1977
 DEPTH 43 METERS

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	19.16	40.28	19.16	29.032	229	0.0	0.18	0.0	0.0	2542	2172
10	19.17	40.28	19.17	29.030	231	0.0	0.13	0.0	0.0		
20		40.34			229	0.1	0.14	0.1	0.0	2531	2162
30	18.78	40.36	18.77	29.196	223	0.2	0.22	0.2	0.0		
40	18.79	40.36	18.78	29.193	222	0.1	0.21	0.5	0.0	2532	2175

STATION 2397

CRUISE AII 93-17
 POSITION 27 DEG 46.2'N 49 DEG 44.5'E
 DATE 22 FEB 1977
 DEPTH 42 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.70	40.44	18.70	29.276	229					2533	2169
10	18.72	40.44	18.72	29.270	227					2534	2180
20	18.68	40.44	18.67	29.283	227					2530	2168
30	18.40	40.48	18.39	29.386	225						
40	18.02	40.55	18.01	29.539	225						

STATION 2398

CRUISE AII 93-17
 POSITION 27 DEG 43.4'N 49 DEG 27.5'E
 DATE 22 FEB 1977
 DEPTH 21 METERS

DEPTH M	TEMP DEG C	SALINITY	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.04	40.59	18.03	29.563	234					2549	2192
1	17.99	40.59	17.99	29.575							
1		40.60									
5	18.54	40.59	18.54	29.433	235						
10	17.83	40.60	17.83	29.623	236					2557	2193
18	17.27	40.60	17.26	29.765	237					2571	2219
18		40.62									
18	17.27	40.61	17.27	29.772							

CRUISE AII 93-17

POSITION 28 DEG 33.0'N 49 DEG 29.0'E

DATE 22 FEB 1977

DEPTH 45 METERS

STATION 2399

DEPTH M	TEMP DEG C	SALINITY	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	19.21	40.40	19.21	29.111	229					2536	2171
10	18.73	40.40	18.73	29.238	229						
20		40.40			230					2544	2175
30	18.26	40.40	18.25	29.361	226						
40	18.24	40.41	18.23	29.374	225						
45	18.23	40.41	18.22	29.376	225					2535	2175

STATION 2400

CRUISE AII 93-17

POSITION 28 DEG 58.0'N 49 DEG 34.0'E

DATE 22 FEB 1977

DEPTH 39 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.73	40.34	18.73	29.192	229	0.6	0.18	0.0	0.1	2544	2172
10	18.60	40.34	18.60	29.225	229	0.6	0.18	0.0	0.1		
20	18.39	40.30	18.39	29.249	225	1.1	0.22	0.0	0.0		
35	18.36	40.32	18.35	29.274	224	1.1	0.21	0.0	0.0	2547	2178

STATION 2401

CRUISE AII 93-17
 POSITION 29 DEG 25.4'N 49 DEG 39.6'E
 DATE 22 FEB 1977
 DEPTH 22 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	17.45	40.28	17.45	29.474	237					2593	2230
10	17.10	40.29	17.10	29.569	237						
15	17.02	40.32	17.02	29.610	236						
20	17.02				234					2593	2228

STATION 2402

CRUISE AII 93-17
 POSITION 29 DEG 45.0'N 49 DEG 30.4'E
 DATE 22 FEB 1977
 DEPTH 15 METERS

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	16.42	39.80	16.42	29.356	236					2614	2259
7	16.37	39.91	16.37	29.454							
12	16.31	39.93	16.31	29.483	243					2603	2242

CRUISE AII 93-17

POSITION 29 DEG 38.7'N 49 DEG 15.2'E

DATE 22 FEB 1977

DEPTH 17 METERS

STATION 2403

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	17.01	39.86	17.01	29.259	238	1.6	0.17	0.0	0.0		
5	17.16	39.91	17.16	29.261	244	1.6	0.20	0.0	0.0		
10	17.31	40.05	17.31	29.331	237	2.0	0.21	0.0	0.0	2557	2186
15	17.46	40.14	17.45	29.364	235	2.3	0.19	0.6	0.0		

CRUISE AII 93-17

POSITION 29 DEG 31.8'N 49 DEG 3.3'E

DATE 23 FEB 1977

DEPTH 18 METERS

STATION 2404

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG	- 85-
1	17.34	40.08	17.34	29.345	235					2606	2246	
5	17.38	40.09	17.38	29.344	235							
10	17.39	40.12	17.39	29.365	236							
15	17.40	40.13	17.40	29.371	235					2624	2249	

CRUISE AII 93/17

STATION 2405

POSITION 29 DEG 09.0'N 48 DEG 37.3'E

DATE 24 FEB 1977

DEPTH 11 METERS

DEPTH	TEMP	SALINITY	THETA	SIGMAT	OXYGEN	SILICATE	PHOSPHATE	NITRATE	NITRITE	ALKALINITY	TOTAL CO2
M	DEG C	0/00	DEG C		UM/KG	UM/KG	UM/KG	UM/KG	UM/KG	UEQ/KG	UM/KG
1	17.83	35.760	17.83	25.912	258	6.1	0.06	0.0	0.0	2689	2322
5	17.91	35.805	17.91	25.927	258	6.2	0.12	0.0	0.0		
10	16.42	38.025	16.42	27.990	244	6.5	0.23	0.0	0.1	2670	2314

STATION 2406

CRUISE AII-93/17
POSITION 29 DEG 21.8'N 48 DEG 50.8'E
DATE 24 FEB 1977
DEPTH 18 METERS

DEPTH M	TEMP DEG C	SALINITY 0/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	16.81	36.864	16.81	27.005	260					2675	2306
5	16.74	37.576	16.74	27.569	255						
10	16.51	38.572	16.50	28.391	243						
17	16.57	38.797	16.57	28.548	239					2656	2298

STATION 2407

CRUISE AII 93/17

POSITION 27 DEG 25.5'N 49 DEG 50.0'E

DATE 24 FEB 1977

DEPTH 37 METERS

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	18.84	40.43	18.84	29.231	227					2571	2210
5	18.84	40.43	18.84	29.233							
5	18.85	40.43	18.85	29.230							
10	18.81	40.43	18.81	29.240	227						
20	18.78	40.43	18.78	29.248	226						
30	18.58	40.45	18.57	29.318							
30	18.72	40.44	18.71	29.273							
35	18.41	40.49	18.41	29.391	223					2542	2183

CRUISE AII 93/17

POSITION 26 DEG 54.8'N 50 DEG 25.1'E

DATE 24 FEB 1977

DEPTH 27 METERS

STATION 2408

DEPTH M	TEMP DEG C	SALINITY O/00	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	19.28	40.48	19.28	29.155	226	0.7	0.21	0.0	0.0	2530	2172
5	19.36	40.47	19.35	29.126	227	0.6	0.21	0.0	0.0		
10	18.88	40.72	18.87	29.445	228	0.7	0.19	0.0	0.0		
15	18.54	40.99	18.53	29.742	230	0.8		0.0	0.0	2545	2185
20		40.11			229	1.0	0.19	0.0	0.0		
25	18.36	40.12	18.36	29.119	229	1.0	0.16	0.0	0.0	2533	2181

CRUISE AII 93/17

POSITION 26 DEG 47.5'N 50 DEG 38.0'E

DATE 24 FEB 1977

DEPTH 21 METERS

STATION 2409

DEPTH M	TEMP DEG C	SALINITY	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	19.76	40.05	19.76	28.695	225					2515	2157
10	19.79	40.05	19.78	28.690	226						
20	19.28	40.51	19.28	29.177	215					2527	2178

CRUISE AII 93/17

POSITION 27 DEG 09.0'N 51 DEG 08.6'E

DATE 24 FEB 1977

DEPTH 62 METERS

STATION 2410

DEPTH M	TEMP DEG C	SALINITY	THETA DEG C	SIGMAT	OXYGEN UM/KG	SILICATE UM/KG	PHOSPHATE UM/KG	NITRATE UM/KG	NITRITE UM/KG	ALKALINITY UEQ/KG	TOTAL CO2 UM/KG
1	19.75	40.00	19.75	28.661	226	0.6	0.20	0.3	0.0	2525	2159
10	19.68	40.12	19.68	28.771	227	0.6	0.17	0.2	0.0		
20	19.21	40.02	19.21	28.820	230	1.0	0.24	0.4	0.0		
30		40.00			222	1.2	0.26	0.0	0.2		
40	18.80	39.96	18.79	28.885	219	1.6	0.29	0.0	0.2	2519	2169
50	18.77	39.94	18.76	28.877	216	2.1	0.32	0.1	0.3		
60	18.88	40.11	18.87	28.979	195	4.1	0.40	0.2	0.3	2533	2191

Appendix 2

CARBON DIOXIDE CHEMISTRY REPORT

STATION 2357

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.379	2.074	1.200	1.844	2.168	4.134	8.186
58	2.380	2.073	1.202	1.844	2.168	4.134	8.185
98	2.371	2.083	1.296	1.866	2.039	4.394	8.160
148	2.352	2.167	2.117	2.004	1.400	6.927	7.986
197	2.345	2.236	3.319	2.108	0.950	10.302	7.824
218	2.344	2.283	4.524	2.165	0.715	13.502	7.710
241	2.335	2.254	3.903	2.136	0.795	11.391	7.773
259	2.342	2.260	3.860	2.140	0.805	11.167	7.780
431	2.324	2.274	4.633	2.164	0.630	11.651	7.740
675	2.318	2.328	7.265	2.214	0.403	17.221	7.570
869	2.378	2.432	10.191	2.300	0.307	22.886	7.454
1154	2.483	2.549	11.185	2.407	0.293	23.320	7.454

STATION 2358

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.384	2.056	1.098	1.812	2.327	3.899	8.214
98	2.342	2.212	2.942	2.075	1.072	9.552	7.860
193	2.328	2.259	4.164	2.142	0.742	11.962	7.750
216	2.334	2.268	4.294	2.154	0.717	12.053	7.744
243	2.333	2.279	4.610	2.165	0.667	12.697	7.720
265	2.336	2.279	4.540	2.166	0.673	12.339	7.730
381	2.325	2.295	5.378	2.184	0.556	13.660	7.677
718	2.326	2.339	7.492	2.225	0.397	17.488	7.563
961	2.417	2.442	8.340	2.321	0.379	18.398	7.550
2641	2.382	2.396	6.810	2.274	0.421	11.727	7.700

STATION 2359

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
74	2.360	2.059	1.228	1.834	2.127	4.311	8.170
123	2.334	2.208	2.976	2.072	1.054	9.633	7.855
170	2.329	2.235	3.568	2.110	0.875	10.895	7.797
194	2.319	2.236	3.799	2.117	0.806	11.169	7.780
215	2.331	2.257	4.011	2.139	0.765	11.467	7.767
240	2.326	2.263	4.331	2.148	0.706	12.141	7.740
261	2.333	2.271	4.332	2.156	0.703	11.905	7.746
285	2.330	2.270	4.428	2.158	0.683	11.983	7.740
334	2.332	2.280	4.620	2.168	0.651	12.190	7.730
485	2.321	2.281	5.001	2.172	0.586	12.514	7.710
673	2.356	2.318	5.110	2.209	0.580	12.203	7.720
720	2.333	2.279	4.396	2.169	0.647	10.393	7.780
772	2.331	2.331	6.786	2.220	0.437	15.891	7.604
961	2.345	2.295	4.512	2.186	0.625	10.086	7.787
1440	2.390	2.450	10.496	2.316	0.289	20.739	7.480
1922	2.427	2.458	8.602	2.337	0.354	15.661	7.594
2161	2.402	2.449	9.487	2.321	0.316	16.781	7.557
2850	2.428	2.413	6.050	2.304	0.487	10.315	7.760
3488	2.429	2.394	5.120	2.285	0.566	8.699	7.830

STATION 2360

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.362	2.044	1.124	1.807	2.247	3.922	8.203
96	2.368	2.079	1.308	1.861	2.048	4.551	8.150
120	2.326	2.209	3.149	2.079	0.993	10.064	7.835
143	2.307	2.194	3.171	2.066	0.963	9.946	7.833
195	2.321	2.235	3.715	2.115	0.821	10.881	7.790
234	2.324	2.246	3.863	2.128	0.779	10.859	7.785
291	2.328	2.254	4.020	2.139	0.750	11.124	7.773
338	2.333	2.258	3.922	2.142	0.759	10.583	7.790
386	2.323	2.271	4.626	2.160	0.643	12.097	7.730
483	2.320	2.271	4.625	2.161	0.629	11.637	7.740
726	2.332	2.303	5.369	2.195	0.541	12.609	7.700
765	2.326	2.312	5.990	2.202	0.486	13.960	7.656
955	2.343	2.334	6.211	2.224	0.469	13.816	7.657
1444	2.358	2.339	5.763	2.233	0.491	11.445	7.723
1924	2.405	2.375	5.331	2.268	0.538	9.664	7.790
2398	2.420	2.323	3.214	2.207	0.841	5.590	8.010
2877	2.424	2.355	3.924	2.243	0.711	6.700	7.936

STATION 2362

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	ED/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.310	2.028	1.265	1.815	1.993	4.349	8.156
123	2.295	2.134	2.379	1.987	1.232	7.839	7.930
194	2.234	2.185	3.420	2.063	0.879	10.532	7.803
243	2.232	2.195	3.614	2.075	0.821	10.709	7.790
289	2.286	2.207	3.843	2.092	0.768	11.021	7.774
317	2.233	2.211	4.016	2.098	0.731	11.322	7.760
332	2.290	2.215	3.891	2.099	0.754	10.913	7.775
469	2.285	2.228	4.339	2.118	0.658	11.298	7.750
658	2.279	2.232	4.610	2.125	0.604	11.341	7.740

STATION 2363

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	ED/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
111	2.332	2.243	3.693	2.122	0.840	10.960	7.790
195	2.343	2.257	3.781	2.138	0.816	10.822	7.790
289	2.334	2.275	4.427	2.164	0.673	11.548	7.750
340	2.331	2.271	4.302	2.159	0.678	10.866	7.770
365	2.330	2.272	4.334	2.160	0.669	10.823	7.770
387	2.330	2.277	4.491	2.166	0.647	11.158	7.757
485	2.326	2.279	4.654	2.169	0.617	11.226	7.750
574	2.325	2.286	4.950	2.178	0.579	11.710	7.730
968	2.346	2.331	5.936	2.223	0.482	12.978	7.680

STATION 2364

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.367	2.031	1.304	1.866	2.026	4.430	8.157
145	2.336	2.210	2.930	2.074	1.054	9.621	7.855
243	2.328	2.238	3.633	2.117	0.841	10.613	7.800
338	2.336	2.259	3.928	2.141	0.775	10.934	7.780
384	2.334	2.267	4.208	2.154	0.714	11.291	7.763
436	2.327	2.271	4.480	2.161	0.655	11.437	7.750
671	2.327	2.280	4.720	2.172	0.610	11.403	7.744
758	2.328	2.293	5.092	2.184	0.567	12.090	7.718
950	2.331	2.302	5.361	2.195	0.534	12.161	7.710

STATION 2365

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.385	2.099	1.417	1.894	1.902	4.747	8.130
121	2.363	2.089	1.358	1.879	1.954	4.551	8.145
195	2.331	2.234	3.536	2.103	0.893	10.939	7.796
291	2.362	2.223	2.758	2.084	1.112	8.415	7.900
338	2.347	2.255	3.574	2.133	0.853	10.112	7.816
384	2.347	2.267	3.883	2.150	0.784	10.694	7.790
486	2.336	2.269	4.151	2.157	0.708	10.678	7.780
573	2.330	2.284	4.722	2.174	0.616	11.586	7.740
960	2.348	2.329	5.795	2.221	0.499	12.730	7.690

STATION 2366

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
10	2.328	2.032	1.182	1.811	2.030	3.947	8.190
55	2.326	2.043	1.264	1.832	1.989	4.217	8.166
106	2.315	2.092	1.677	1.912	1.616	5.511	8.065
121	2.296	2.177	3.012	2.046	0.996	9.435	7.850
141	2.304	2.106	1.933	1.942	1.442	6.257	8.010

STATION 2367

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.337	2.024	1.097	1.794	2.185	3.621	8.220
20	2.335	2.034	1.161	1.812	2.104	3.827	8.200
34	2.338	2.049	1.230	1.833	2.031	4.051	8.180
49	2.339	2.042	1.188	1.823	2.071	3.883	8.194
60	2.353	2.069	1.268	1.855	2.003	4.123	8.174

STATION 2368

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.402	2.069	1.060	1.824	2.328	3.451	8.243
10	2.396	2.059	1.027	1.812	2.349	3.304	8.256
20	2.403	2.104	1.236	1.877	2.136	4.055	8.185
29	2.429	2.124	1.270	1.896	2.138	4.176	8.175
38	2.441	2.142	1.338	1.918	2.093	4.413	8.154
48	2.458	2.137	1.241	1.904	2.213	4.039	8.184
53	2.461	2.140	1.239	1.905	2.219	4.023	8.185
57	2.472	2.141	1.204	1.902	2.272	3.892	8.197
76	2.468	2.133	1.184	1.894	2.269	3.736	8.204

STATION 2371

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.453	2.119	1.135	1.874	2.320	3.678	8.220
20	2.483	2.134	1.099	1.883	2.402	3.506	8.237
39	2.491	2.168	1.243	1.932	2.233	3.947	8.195
49	2.494	2.174	1.254	1.939	2.219	3.954	8.194
68	2.499	2.185	1.293	1.953	2.182	4.069	8.184

STATION 2372

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.500	2.152	1.120	1.901	2.339	3.511	8.234
5	2.493	2.133	1.084	1.884	2.422	3.385	8.244
10	2.483	2.132	1.105	1.884	2.372	3.425	8.236
15	2.483	2.133	1.111	1.886	2.364	3.439	8.234

STATION 2374

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.483	2.130	1.082	1.874	2.435	3.475	8.240
10	2.499	2.133	1.055	1.878	2.481	3.332	8.254
20	2.496	2.139	1.071	1.883	2.447	3.359	8.250

STATION 2376

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.465	2.111	1.057	1.854	2.450	3.437	8.245
20	2.531	2.168	1.070	1.905	2.511	3.375	8.255
35	2.501	2.154	1.118	1.902	2.392	3.508	8.236

STATION 2378

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.440	2.093	1.072	1.848	2.380	3.487	8.240
40	2.499	2.156	1.143	1.906	2.374	3.650	8.224
60	2.503	2.161	1.153	1.912	2.361	3.653	8.223

STATION 2380

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.431	2.087	1.066	1.837	2.392	3.534	8.237
59	2.491	2.178	1.321	1.946	2.181	4.313	8.165
83	2.501	2.171	1.232	1.931	2.279	3.967	8.195

STATION 2382

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.446	2.097	1.037	1.841	2.439	3.385	8.254
10	2.462	2.111	1.090	1.860	2.401	3.533	8.230
15	2.462	2.119	1.135	1.874	2.334	3.641	8.216

STATION 2384

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.391	2.045	1.004	1.795	2.407	3.334	8.256
30	2.417	2.098	1.151	1.861	2.241	3.767	8.214
69	2.469	2.140	1.211	1.903	2.248	3.864	8.196

STATION 2385

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.390	2.052	1.034	1.804	2.366	3.450	8.245
40	2.409	2.093	1.171	1.860	2.207	3.825	8.205
70	2.460	2.149	1.306	1.921	2.147	4.252	8.165

STATION 2386

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.548	2.176	1.050	1.908	2.566	3.299	8.264
10	2.536	2.174	1.082	1.913	2.496	3.383	8.253
15	2.530	2.175	1.110	1.919	2.440	3.441	8.244

STATION 2387

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.486	2.155	1.187	1.912	2.299	3.798	8.210
30	2.515	2.177	1.177	1.933	2.320	3.624	8.224

STATION 2388

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.496	2.152	1.128	1.901	2.386	3.601	8.230
30	2.513	2.176	1.172	1.929	2.339	3.676	8.223
50	2.513	2.177	1.176	1.931	2.326	3.656	8.223

STATION 2389

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.467	2.125	1.106	1.878	2.363	3.531	8.235
20	2.473	2.125	1.078	1.872	2.411	3.439	8.245

STATION 2390

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EO/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.453	2.108	1.077	1.857	2.391	3.475	8.240
20	2.461	2.116	1.091	1.866	2.386	3.528	8.236
50	2.486	2.146	1.148	1.899	2.352	3.687	8.220
70	2.499	2.185	1.311	1.954	2.179	4.194	8.175

STATION 2391

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EO/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.442	2.088	1.010	1.833	2.446	3.215	8.267
20	2.459	2.114	1.075	1.863	2.393	3.439	8.244
40	2.489	2.189	1.366	1.963	2.110	4.397	8.160

STATION 2392

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EO/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.516	2.154	1.046	1.895	2.483	3.186	8.270
5	2.521	2.162	1.061	1.903	2.471	3.241	8.265
10	2.528	2.172	1.077	1.917	2.440	3.227	8.266

STATION 2393

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EO/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.518	2.160	1.066	1.904	2.452	3.232	8.265
30	2.524	2.165	1.063	1.910	2.452	3.178	8.270
50	2.534	2.175	1.067	1.917	2.463	3.191	8.270

STATION 2394

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.543	2.179	1.066	1.916	2.506	3.268	8.264
20	2.546	2.182	1.067	1.920	2.505	3.251	8.266
50	2.541	2.180	1.075	1.920	2.432	3.270	8.263

STATION 2395

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.542	2.172	1.053	1.908	2.537	3.268	8.265
30	2.540	2.174	1.058	1.910	2.518	3.261	8.265
50	2.543	2.175	1.058	1.913	2.522	3.254	8.266

STATION 2396

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.542	2.172	1.055	1.908	2.536	3.276	8.264
40	2.532	2.175	1.101	1.920	2.444	3.335	8.250

STATION 2397

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.533	2.169	1.062	1.907	2.498	3.258	8.263
20	2.534	2.180	1.116	1.927	2.424	3.421	8.246
40	2.530	2.168	1.066	1.911	2.467	3.209	8.266

STATION 2398

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.549	2.192	1.107	1.937	2.442	3.336	8.255
10	2.557	2.193	1.078	1.933	2.489	3.230	8.267
18	2.571	2.219	1.140	1.967	2.411	3.359	8.254

STATION 2399

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.536	2.171	1.074	1.910	2.502	3.340	8.256
45	2.535	2.175	1.075	1.916	2.469	3.252	8.263

STATION 2400

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.544	2.172	1.035	1.905	2.556	3.175	8.274
35	2.547	2.178	1.045	1.913	2.534	3.172	8.274

STATION 2401

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.593	2.230	1.100	1.968	2.502	3.253	8.270

STATION 2402

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.614	2.259	1.125	2.000	2.465	3.221	8.276
12	2.603	2.242	1.096	1.983	2.486	3.128	8.284

STATION 2403

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
10	2.557	2.186	1.022	1.919	2.549	3.006	8.293

STATION 2404

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.606	2.246	1.122	1.986	2.488	3.303	8.267
15	2.624	2.249	1.071	1.979	2.592	3.160	8.285

STATION 2405

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.689	2.322	1.073	2.047	2.651	3.130	8.316
10	2.670	2.314	1.129	2.049	2.528	3.200	8.293

STATION 2406

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.675	2.306	1.059	2.032	2.634	3.017	8.320
17	2.656	2.298	1.127	2.033	2.522	3.221	8.286

STATION 2407

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.571	2.210	1.116	1.949	2.489	3.438	8.250
35	2.542	2.183	1.097	1.927	2.456	3.338	8.255

STATION 2408

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.530	2.172	1.105	1.916	2.451	3.447	8.244
15	2.545	2.185	1.102	1.927	2.463	3.375	8.250
25	2.533	2.181	1.107	1.927	2.422	3.357	8.253

STATION 2409

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.515	2.157	1.089	1.900	2.459	3.432	8.246
20	2.527	2.178	1.139	1.925	2.403	3.551	8.233

STATION 2410

DEPTH	TALK	TCO2	(CO2)	(HCO3)	(CO3)	PCO2	PH
M	EQ/KG	M/KG	M/KG	M/KG	M/KG	ATM	
	(E-3)	(E-3)	(E-5)	(E-3)	(E-4)	(E-4)	
1	2.525	2.159	1.060	1.897	2.515	3.341	8.257
20	2.541	2.153	0.993	1.886	2.626	3.033	8.286
40	2.519	2.169	1.112	1.918	2.404	3.410	8.247
60	2.533	2.191	1.169	1.944	2.357	3.596	8.230

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