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HYDROGRAPHIC, CARBON DIOXIDE, NUTRIENT, AND PRODUCTIVITY MEASUREMENTS FROM THE SOUTH ATLANTIC DURING JULY AND AUGUST OF 1991

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ABSTRACT

From July 11 to September 2, 1991, the National Oceanic and Atmospheric Administration's (NOAA) Carbon Dioxide (CO_2) and Radiatively Important Trace Species (RITS) programs participated in an oceanographic research cruise conducted aboard the NOAA ship MALCOLM BALDRIGE. This report presents the research from that cruise that was conducted for the CO_2 program, which has recently been renamed the Ocean-Atmosphere Carbon Exchange Study (OACES). During Leg 1 of this cruise, (Fortaleza, Brazil to Montevideo, Uruguay), 33 CTD hydrographic casts and 17 Go-Flo™ hydrographic (productivity) casts were conducted. Samples were also collected while underway on Leg 1, for the determination of the fugacity of CO_2 (fCO_2) of the air and surface water. Leg 2, (Montevideo, Uruguay-Fortaleza, Brazil), collected 21 days of underway fCO_2 measurements, conducted five CTD hydrographic casts and nine Go-Flo™ hydrographic (productivity) casts. This report contains tables of the following data: hydrography from each CTD cast at the bottle trip depths, (including salinity, oxygen and nutrients), discrete carbon parameters, underway carbon parameter values, and data from productivity casts. Descriptions of the sampling techniques and analytical methods used in the collection and processing of these data are also presented in this report.

KEY WORDS: alkalinity, CO_2, carbon dioxide, chlorophyll , CTD, dissolved organic carbon, hydrography, nutrients, productivity, salinity, sigma-theta, South Atlantic, temperature

1. INTRODUCTION

Human activity is producing gases, most notably carbon dioxide (CO_2), and other trace gases including chlorofluorocarbons, nitrous oxide and methane, which are being released into the atmosphere and causing more of the radiation being emitted by the earth to be absorbed. This increased absorption is resulting in a net warming of the earth's atmosphere and creating a phenomenon commonly known as the "Green House Effect". Only about half of all of the anthropogenic CO_2 that is released into the atmosphere each year remains there. The global ocean is thought by many to be the ultimate destination, or "sink" for the 'missing' CO_2. The understanding of the absorption and storage properties of the oceans is therefore essential to assessing the potential for climatic change due to man's effect on the radiation balance of the atmosphere.

The National Oceanic and Atmospheric Administration's (NOAA) Carbon Dioxide (CO_2) program and Radiatively Important Trace Species (RITS) programs participated in a multifaceted oceanographic research cruise conducted aboard the NOAA ship MALCOLM BALDRIGE from July 11 to September 2, 1991. The NOAA CO_2 program has been recently renamed and is now called Ocean-Atmosphere Carbon Exchange Study (OACES). The two primary objectives of the cruise were to: (1) assess the role of biomass burning emissions from surrounding continents in controlling the distribution of ozone in the tropical South Atlantic atmospheric boundary layer for the RITS program and (2) to measure and establish baseline values and determine source and sink regions of CO_2 in the equatorial and the South Atlantic Ocean for OACES. This report presents only the OACES-related data from that cruise. These data include: hydrography, nutrients, discrete carbon, underway carbon parameters and productivity data from both legs of the cruise.

1.1. DESCRIPTION OF STUDY AREA

This study was conducted on two consecutive research cruise legs during 1991. Leg 1 sailed from Fortaleza, Brazil on July 11, 1991, proceeded NE to approximately 5° N and 25° W and then turned south and steamed along the 25° W line to 28° S. At 28° S, the track line turned SW to 32° W and continued South to 42° S before turning NW and ending in Montevideo, Uruguay on August 5, 1991. Leg 2 departed Montevideo, Uruguay on August 13, 1991 and proceeded NE to a point about 2° S and 4° W before subsequently steaming NW, and then SW ending in Fortaleza, Brazil on September 2, 1991. The cruise tracks for Legs 1 and 2 are shown on Figure 1.

2. DATA COLLECTION AND ANALYTICAL METHODS

Thirty-three CTD hydrographic stations on Leg 1, and five CTD hydrographic stations on Leg 2 were occupied to collect discrete water sample data. A CTD/rosette unit with a Neil Brown™ CTD instrument equipped with 24, 10-L Niskin™ bottles was utilized for these casts. Water samples were collected from the Niskin™ bottles for salinity,

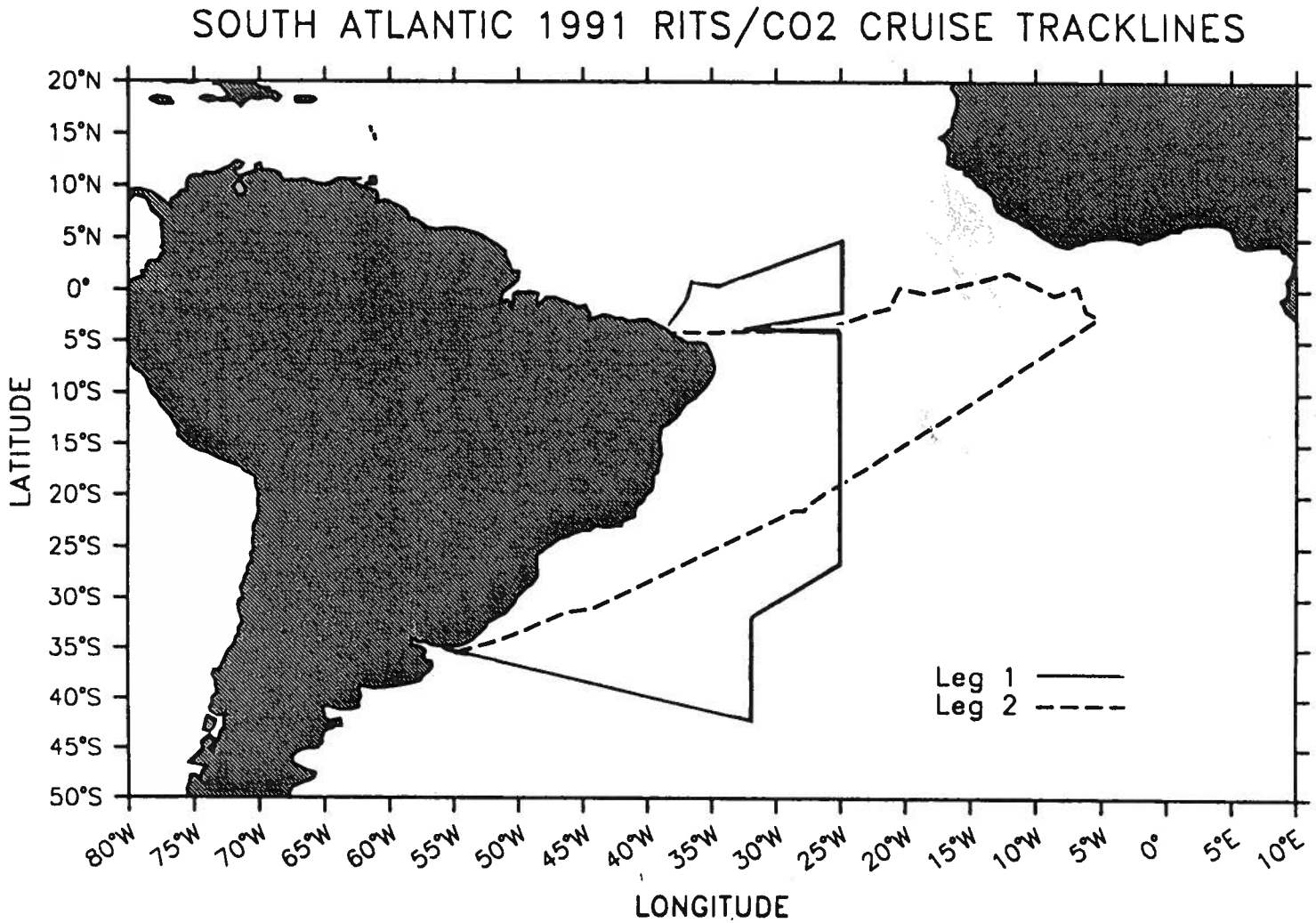

Figure 1: Study area and cruise track lines for NOAA Ship MALCOLM BALDRIGE.

oxygen and nutrient measurements as well as carbon related parameters including total dissolved inorganic CO_2 (TCO_2), fugacity of CO_2 (fCO_2), total alkalinity (TAlk) and Dissolved Organic Carbon (DOC). Continuous underway air and seawater surface samples for fugacity of CO_2 (fCO_2) analysis were collected during both legs of the cruise. Go-Flo™ hydrographic casts were also conducted on both legs for productivity measurements. These casts were made using 10-L Go-Flo™ bottles mounted on Kevlar™ hydrowire. Salinities and sea surface temperatures were also measured continuously during the entire cruise by a thermosalinograph. In most cases, if there was no bottle salinity value available for a given sample position, the electronically derived CTD value was used in calculations requiring a salinity measurement. More detailed information on individual data collection, or analyses procedures may be found in the respective data sections.

2.1 HYDROGRAPHIC METHODS

2.1.1 CTD and Hydrographic Operations

All CTD operations were conducted using the same Neil Brown™ Instrument Systems Mark III CTD equipped with standard temperature and conductivity sensors, a Beckman™ polarographic dissolved oxygen sensor, and an auxiliary Seabird™ temperature sensor. Laboratory calibrations were performed, before and after the cruise, and were used in conjunction with Niskin™ bottle data, to calibrate the CTD data. Pressure and temperature data listed in this report are based on the post-cruise calibration. Temperature accuracy is estimated to be ± .005°C, and pressure accuracy to be ± 5 decibars.

Water sampling

Water samples were collected in 10-L sampling bottles using a General Oceanics 24-place rosette system. Bottles were electronically fired during the upcast, with markers placed in the digital file for use in determining exact bottle trip CTD values for calibration. Once on deck, aliquots were taken for laboratory analyses. Figure 2 shows the CTD cast bottle trip locations used for hydrographic and other discrete water sample measurements collected during Leg 1 of the cruise. More detailed information about the subsampling and analysis procedures for the various water property measurements may be found below. Tables with the hydrographic data from this study may be found in Appendix B.

Oxygen

Dissolved oxygen samples were the first samples collected from 10-L Niskin™ bottles once the CTD unit was back on deck. The oxygen samples were collected, in 150-mL ground-glass stoppered sample bottles and were analyzed using the method described by Carpenter (1965), with computer-controlled colorimetric endpoint determination as described in Friederich, Sherman, and Codispoti (1984). Oxygen samples that have been collected and analyzed using the above methodology have a precision greater than one percent. Values are marked as questionable by italicizing them in the data tables for any of the following reasons: High or low photometric endpoints in the titration process due to improper light levels; possible contamination during processing (air bubbles seen in bottle, etc.); inexplicable large differences between bottle sample data values and apparently valid electronic CTD values.

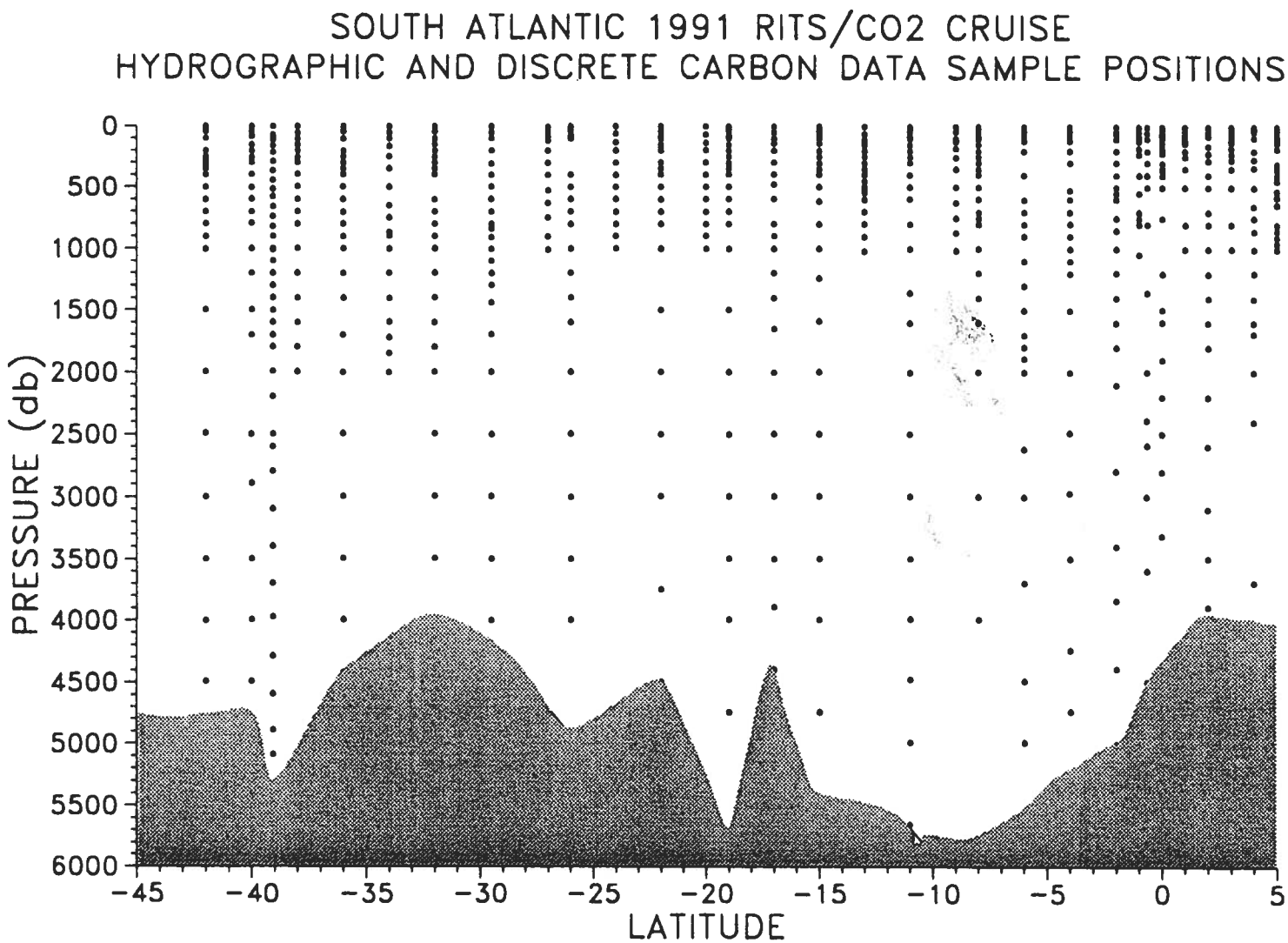

Figure 2: Sampling positions for all Niskin™ Bottle derived data. The coarse smoothing grid for bottom topography causes sharp topographic features, such as the mid Atlantic Ridge at 0° N, to be eliminated.

Salinity

Salinity samples were collected in 200-mL bottles. New caps were used for each sample. Bottle salinities were measured using a Guildline™ 8400 Autosal and P114 standard seawater in a temperature controlled van. Conductivity ratios were converted to salinities conforming to the PSS78 standard. Since CTD conductivity was relatively stable (except casts 32 and 33), bottle salinities that differed substantially from CTD salinity measurements are marked as questionable in the data tables.

Temperature Density and Depth

Depth, Potential Temperature and Density (sigma-theta) values listed in the tables were calculated using standard Woods Hole Oceanographic Institute (W.H.O.I.) hydrographic subroutines. Depth is calculated from pressure using methods based on Saunders and Fofonoff (1976); density is determined by methods presented in F. Millero and A. Poisson (1981); and potential temperature referenced to zero pressure (theta) is calculated by integrating the adiabatic lapse rate using a fourth-order Runge-Kutta algorithm. Sigma-theta values, (ten meter averages), from the Leg 1 CTD casts are contoured and presented in Figure 3.

2.1.2 Nutrient Analysis Methods

Nutrient samples were collected from 10-L Niskin™ bottles in aged 60-mL linear polyethylene bottles after three complete seawater rinses and stored in the dark at 4°C until analysis was completed (within 24 hours of sample collection). Concentrations of dissolved inorganic nitrite (NO_2), dissolved inorganic nitrate (NO_3), and silicate (SiO_4), reported in micromoles/liter, were determined using an AlpKem™ RFA/2 Auto-Analyzer aboard ship.

Nitrates

The automated colorimetric procedures and methodologies used in the analysis of nitrite and nitrate are essentially similar to those described by Armstrong et al. (1967), with modifications described in Atlas et al. (1971). Standardizations were performed prior to each sample run with working solutions prepared aboard ship from pre-weighed "Baker Analyzed" reagent grade standards. Nitrite (NO_2) was determined by diazotizing with sulfanilamide and coupling with N-1 napthylethelendiamine dihydrochloride to form an azo dye. The color produced is proportional to the nitrite concentration. Samples for nitrate (NO_3) analysis were passed through a copperized cadmium column, which reduces nitrate to nitrite and the resulting nitrite concentration was then determined as described above. The detection limits for nitrite and nitrate were 0.1 µmoles/L and 0.4 µmoles/L, respectively. The precision of duplicate standards measurements was ±0.25% at 8 µmoles/L for nitrite and ± 0.2% at 40 µmoles/L for nitrate. The accuracy for both analytes was assumed to be ±1 % since no absolute standards were available. Contoured nitrate values from Leg 1 of this study are presented in Figure 4.

Silicates

The analytical procedures and methodologies used in the analysis of silicate are essentially similar to those described by Armstrong et al. (1967), with modifications described in Atlas et al. (1971). Silicate

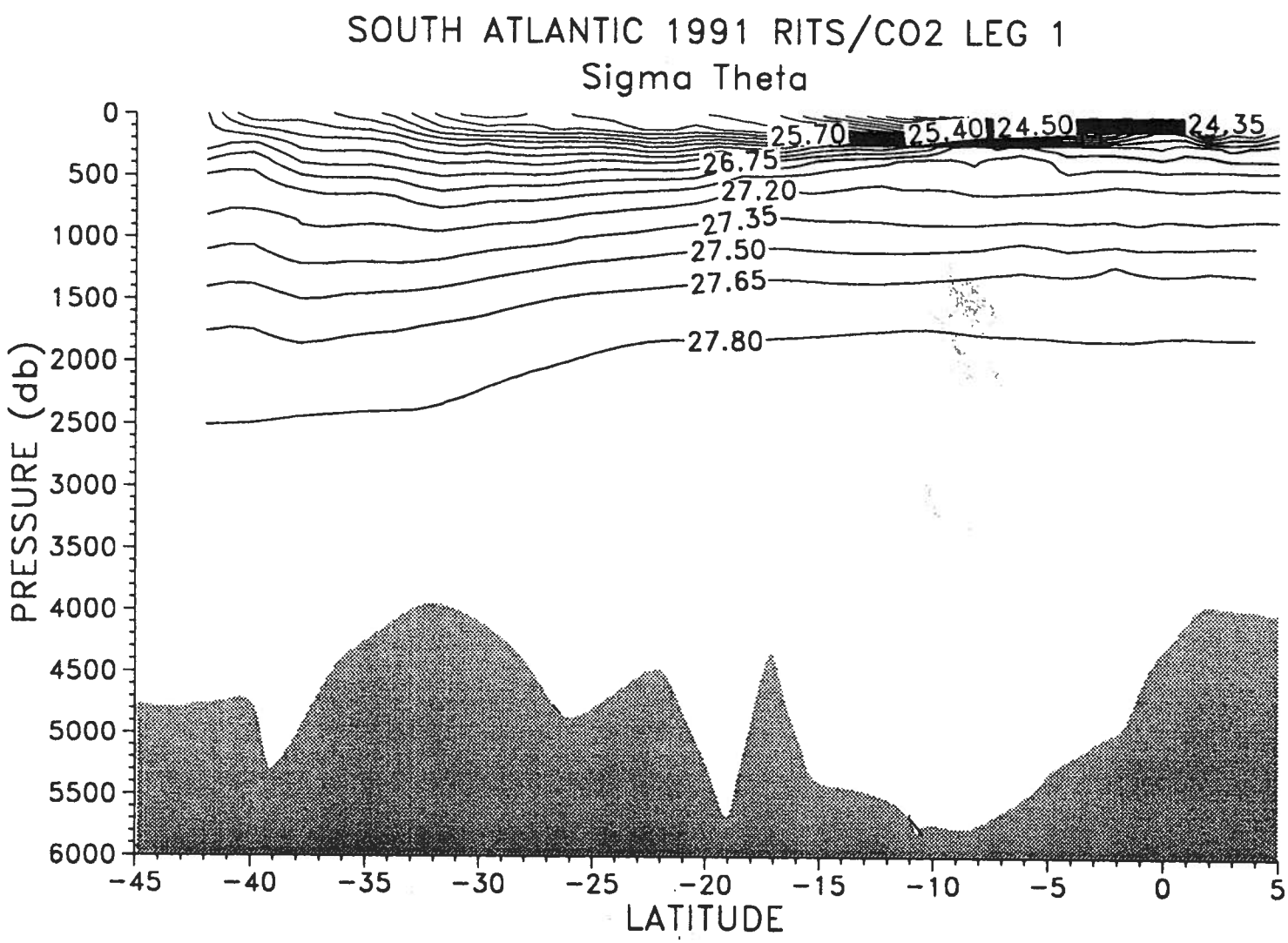

Figure 3: Potential density cross section utilizing 10 decibar averaged sigma-theta data from CTD stations on Leg 1. Contour interval = 0.15. See Figure 2 caption for comment regarding bottom topography.

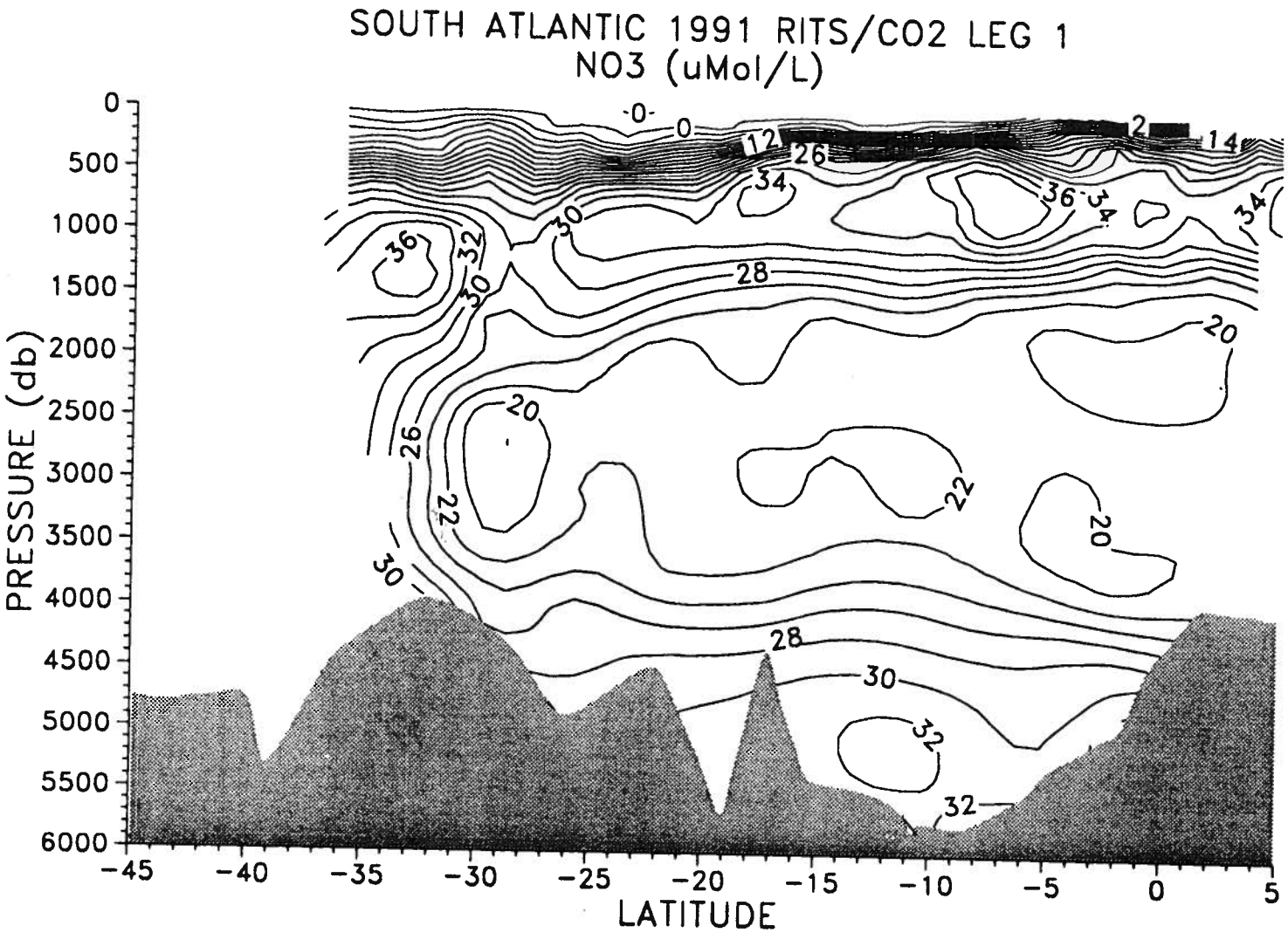

Figure 4: Nitrate data cross section for Leg 1. Contour interval = 2 µmol/L. See Figure 2 caption for comment regarding bottom topography.

was determined from the reduction of silicomolybdate in acidic solution to molybdenum blue by ascorbic acid. The color produced is proportional to the concentration of silicate in the sample, with a detection limit of 0.4 µmoles/L. The precision of duplicate measurements was ±0.17%, at 120 µmoles/L of silicate, with an assumed accuracy of ±1 %, since no absolute standards were available. Figure 5 is a contour plot of the silicate values from Leg 1 of this cruise.

2.2 CARBON PARAMETERS

2.2.1 Total Dissolved Inorganic CO_2

Sampling

Samples for dissolved inorganic CO_2 (TCO_2) analysis were drawn from 10-L Niskin™ bottles into 500-mL Pyrex™ bottles using Tygon™ tubing. Bottles were rinsed once, and while being careful to not create bubbles, they were filled from the bottom until half of the bottles' volume had overflowed. The tube was pinched off and withdrawn, creating a 5-mL headspace volume. Each sample had 0.2 mL of a saturated $HgCl_2$ solution added to act as a sample preservative. The sample bottles were then sealed with glass stoppers lightly covered with Silastic™ grease. The samples were then stored in darkness at ambient (room) temperature for a maximum of two days prior to being analyzed.

Analysis

CO_2 analysis was performed by extracting the inorganic carbon in the sea water samples by acidification and subsequent displacement of the gaseous CO_2 into a coulometer cell. Two coulometers were used on the cruise. One was patterned after that of D. Chipman of Lamont-Doherty Earth Observatory (L.D.E.O.) and shall hereafter be referred to as the "Chipman" system; the other had a Single Operator Multiparameter Metabolic Analyzer (SOMMA) inlet system developed by K. Johnson of Brookhaven National Laboratories (B.N.L.) and shall be called the "Johnson" system.

The samples were introduced into the "Chipman" system by injecting a 23-mL aliquot from a 500-mL bottle with a glass syringe. A metal syringe guide/stopper assured that the injection volume was constant and reproducible. The temperature of the water remaining in the bottle was measured immediately after withdrawing the sample and was used to determine the density of the sample injected into the extraction tube. Subsequently, 1 mL of 10% phosphoric acid was injected into the extraction tube. The acid was purged with N_2 prior to use and stored in a bottle with CO_2-free headspace. The CO_2 was extracted with ultra high purity N_2 which was run through a Malcosorb™ CO_2 scrubber. The evolved CO_2 gas went through a PFTE™ 0.2 micron filter to remove water droplets and aerosols and then titrated coulometrically using an UIC (model 5011) CO_2 coulometer. The gas stream was not dried prior to introduction into the cell. Sample analyses time was set to 20 minutes.

Prior to analysis on the automated "Johnson" system, each 500-mL sample bottle was inserted into a water bath at 20°C. Water from the bottle was displaced into a thermostatted pipette with a (500 ppm CO_2 in air) pressure gas. The water was then injected into an extraction chamber which contained 1 mL of 10% H_3PO_4 solution which had been stripped of CO_2 prior to injection of the sample. The evolved gas was

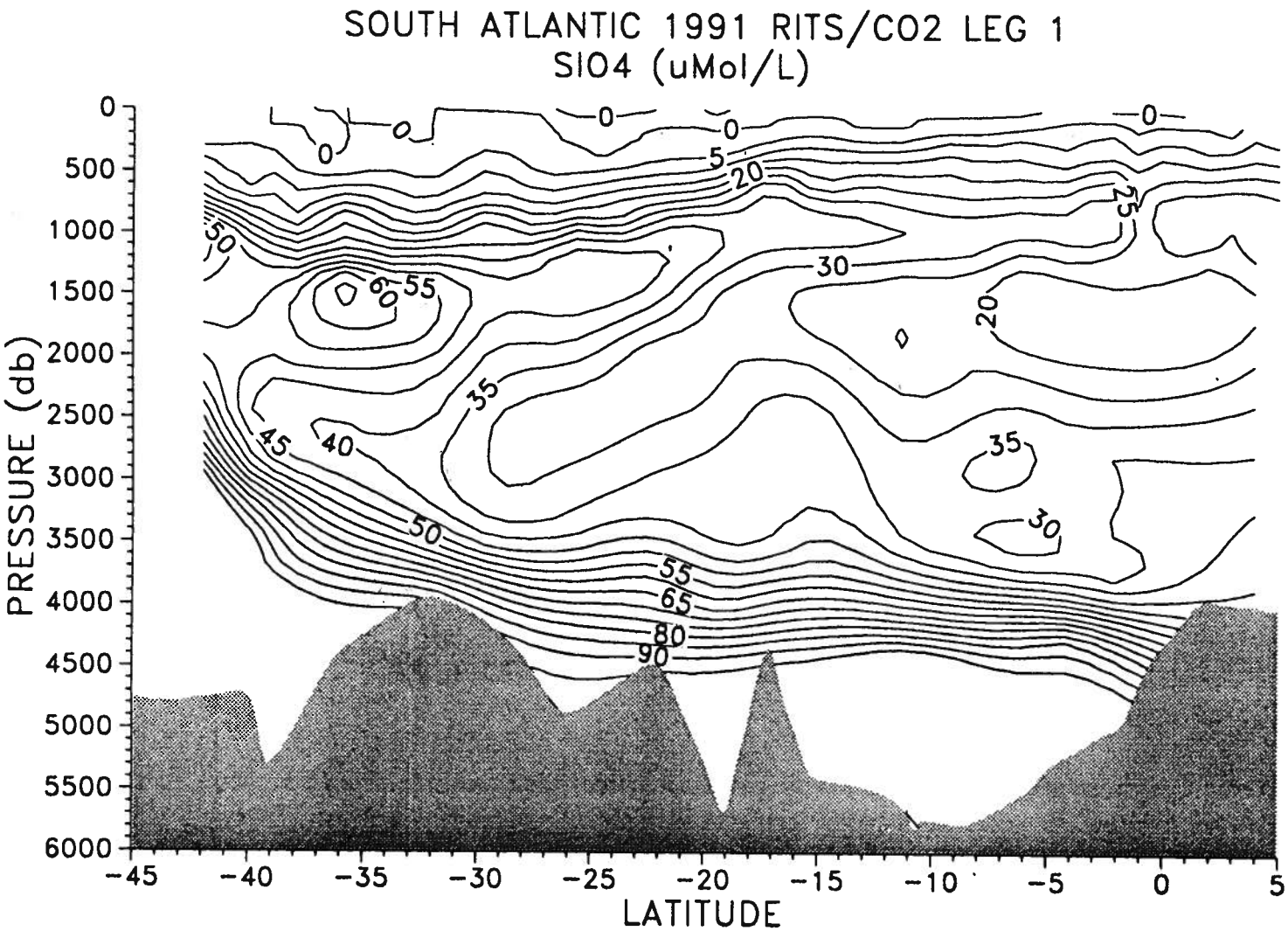

Figure 5: Silicate data cross section for Leg 1. Contour interval = 5 µmol/L. See Figure 2 caption for comment regarding bottom topography.

run through a condenser and a $MgClO_4$ drying column to dry the gas stream, and through an ORBO-53™ tube to remove volatile acids. Additional details concerning this system and procedures are presented in Johnson (1992), and Johnson et al. (1993).

Both the "Johnson" and "Chipman" coulometers were calibrated by injecting aliquots of pure CO_2 using an 8-port or 10-port valve with two sample loops of known volume. The CO_2 gas volumes bracketed the amount of CO_2 extracted from the water samples. The gas loops of the "Johnson" system were calibrated by weight with water at B.N.L. (Wilke et al., 1993). The gas loop volumes on the "Chipman" system were calibrated by alternating gas loop injections from the two gas sampling valves with the same coulometer using the "Johnson" loop volume as a reference. Liquid reference materials (RM's) consisting of bicarbonate in sodium chloride solution were supplied by A. Dickson of Scripps Institute of Oceanography (S.I.O.) and were run on each coulometer cell during the cruise. The results were close to the values determined manometrically by C. D. Keeling at S.I.O.

Av. value of RM's run on "Chipman"	2306.18 ± 1.47	n = 30
Av. value of RM's run on "Johnson"	2304.58 ± 1.50	n = 100
Manometric value [Dickson Batch #6]	2304.74 ± 0.94	n = 10

Note: All determinations, including replicates from the same bottle are pooled for the averages.

Calculations

The instrument was calibrated three times for each cell solution with a set of gas loop injections. Calculation of the amount of CO_2 injected was determined according to methods described in the Department of Energy (DOE) CO_2 handbook (1991). The gas loops yielded a calibration factor for the instrument defined as:

$$\text{Cal. factor} = \frac{\text{calculated moles of CO2 injected from gas loop}}{\text{measured moles of CO2 injected}}$$

The concentration of CO_2 ($[CO_2]$) in the samples was determined according to:

$[CO_2]$ =

$$\frac{\text{Cal. factor} * (\text{Counts-Blank} * \text{Run Time}) * 2.0728 * 10^{-4}\ \mu\text{mol/count}}{\text{pipette volume} * \text{density of sample}}$$

where Counts is equal to the instrument reading at the end of the analysis; Blank is the counts/minute determined from blank runs performed at least once for each cell solution; Run Time is the minutes the sample is run; $2.0728 * 10^{-4}$ is the conversion factor from counts to µmol. The pipette volume (or syringe volume) was determined by taking aliquots of distilled water at a known temperature from the volumes prior to, during, and after the cruise. No trend was observed in the change in volumes. Standard deviation in the series of measurements over three months was 0.03% of the total weight. The weights with the appropriate densities were used to determine the volume of the syringes

and pipette. Calculations of pipette and syringe volumes, of densities, and of final CO_2 concentrations were all performed according to procedures outlined in the DOE CO_2 handbook (1991). All total CO_2 values are corrected for dilution by 0.2 mL of mercuric chloride solution assuming the solution is saturated with atmospheric CO_2 levels and total water volume is 540 mL yielding a correction factor of 1.00037. Figure 6 shows a contour plot of the coulometer derived TCO_2 values from Leg 1 of this study.

2.2.2 Discrete fugacity of CO_2 (fCO_2)

Sampling

Samples were drawn from 10-L Niskin™ bottles into 500-mL Pyrex™ volumetric flasks using Tygon™ tubing. Bottles were rinsed once and while taking care not to entrain air bubbles, were filled from the bottom until half the bottles' volume overflowed. Five mL of water was then withdrawn with a pipette to create a small expansion volume. A saturated $HgCl_2$ solution, (0.2 mL), was added to the samples as a preservative. The sample bottles were then sealed with a screw cap containing a polyethylene liner and stored in darkness at room temperature for a maximum of two days prior to analysis.

Discrete fCO_2 analyzer

The AOML discrete fCO_2 system is patterned after the design described in Chipman et al. (1993) and is discussed in detail in Wanninkhof and Thoning (1993). The major difference between the systems is that the AOML system uses a Licor™ (model 6262) non-dispersive infrared analyzer, while the Chipman et al. system utilizes a gas chromatograph with a flame ionization detector and a methanizer, which quantitatively converts CO_2 into CH_4 for analysis.

Samples are collected in 500-mL volumetric flasks and are brought to a temperature of 20.00 ± 0.02°C, using a pre-bath at 19-21°C and a Neslab™ (model RT-220) controlled temperature bath. A 60-mL headspace is created in the flask by replacing the water using a compressed standard gas with a CO_2 mixing ratio close to the fCO_2 of the water. The headspace is circulated in a closed loop through the infrared analyzer (IR), which measures CO_2 and water vapor levels in the sample cell. The headspaces of the two flasks are equilibrated simultaneously in channels A and B. While headspace from the flask in channel A goes through the IR analyzer, the headspace of the flask in channel B is recirculated in a closed loop. The sample in the A channel is equilibrated for 17 minutes while the air from the headspace of the flask flows through the IR analyzer. The sample in the B channel is circulated in a closed loop for 10 minutes and through the IR for 8 minutes. An expandable volume, consisting of a balloon, keeps the contents of the flasks at room pressure.

In order to maintain measurement accuracy and precision, a set of six gas standards is run through the system after every four to ten seawater samples. The standards have mixing ratios of 201.4, 354.1, 517.0, 804.5, 1012.2, and 1529 ppm, which bracket the fCO_2 at 20°C (fCO_2,20) values observed in the water column of the South Atlantic.

The determination of fCO_2 in water from the discrete analyses involves several steps. The mixing ratio and detector response for the

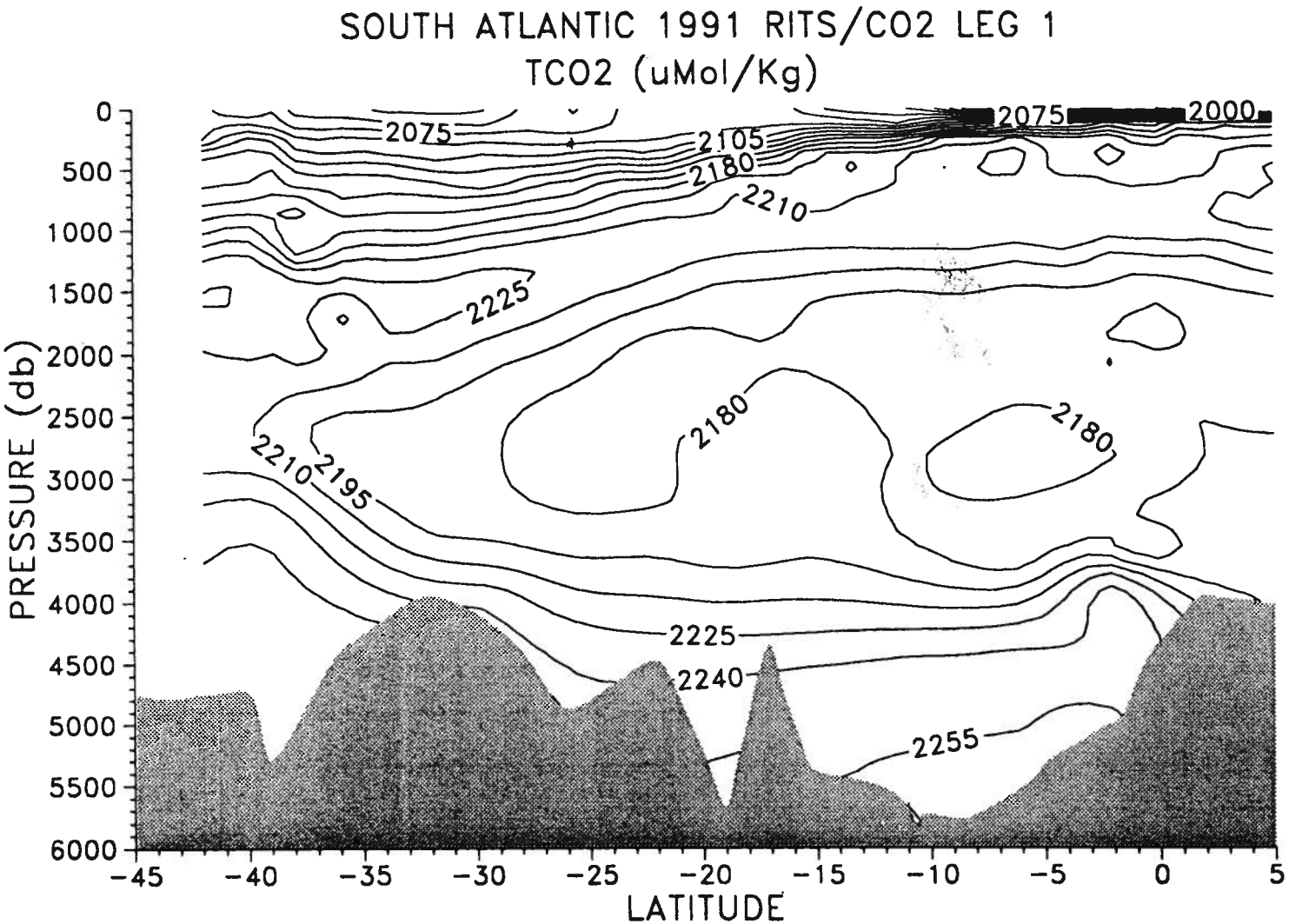

Figure 6: Dissolved inorganic carbon dioxide, TCO_2 (AOML value) cross section for Leg 1. Contour interval = 15 µmol/Kg. See Figure 2 caption for comment regarding bottom topography.

standards are normalized for temperature and pressure. The IR voltage output for samples are normalized with regard to pressure and are corrected for the presence of water vapor and converted to a mixing ratio. The mixing ratio in the headspace is converted to fugacity and corrected to fugacity of CO_2 in the water sample prior to equilibration by accounting for change in total CO_2 in water during the equilibration process (for details see, Wanninkhof and Thoning, 1993). The change in the fCO_2 of water, (fCO_2w), caused by the change in TCO_2 is calculated using the constraint that total alkalinity (TAlk), remains constant during exchange of CO_2 gas between the headspace and the water. The calculation is outlined in the appendix of Peng et al. (1987).

2.2.3 Methods for Potentiometric Total Alkalinity, TCO_2 and pH Measurements

The total alkalinity and inorganic carbon (Dickson, 1981) in the water samples was determined during the cruise by making potentiometric titrations. The two systems used consisted of a Metrohm™ 615 titrator and Metrohm™ 605 pH meter that are operated by an Apple™ computer (Thurmond and Millero, 1982). The titration is done by adding HCl to the seawater past the carbonic acid end point. Seawater samples were contained in a water jacketed cell controlled to a constant temperature of 25°C with a Forma™ water bath. Due to the large number of samples to be measured, the titrations were not made over the entire pH range. This allowed a complete titration to be made in about 10 minutes. Unfortunately during the cruise the disk reader of the Apple™ computers failed and the titrations had to be run by hand.

The titrant solution was prepared from standard HCl and reagent grade NaCl. The 0.25 M HCl contained 0.45 M NaCl to yield an ionic strength equivalent to the seawater (0.7 M). The acid was standardized with weighed amounts of Na_2CO_3 dissolved in 0.7 M NaCl solution in the laboratory. A blank titration was made to evaluate the residual alkalinity (14 μM) due to impurities in the NaCl. The normality of the acid was found to be 0.2514 ± 0.0001 M). Measurements made in the laboratory after the cruise yielded the same concentration of the HCl.

The electrode system used to measure the emf of the sample during a titration consisted of a ROSS™ glass pH electrode and an Orion™ double junction reference electrode. The response of the electrodes were determined by HCl titration in 0.7 M NaCl solution. Electrodes with non-Nernstian behavior were discarded (slope larger than ± 0.5 mV of the theoretical slope). Three cells were used during the cruise (Cell 1, 2 and 3). They had volumes (V) and standard emf's, (E*), in seawater of $V = 231.10 \pm 0.02\ cm^3$, $238.99 \pm 0.02\ cm^3$, $239.64 \pm 0.02\ cm^3$; E*= 592, 585, 580 mV (± 1 mV), respectively.

The total alkalinity and total CO_2 were calculated from the volumes of acid added and the measured emf's using a least-squares Gran technique. A chemical model (Dickson, 1981) was used to determine the equivalence points on the titration curve.

The initial emf reading of the seawater solution before the titration began was used to determine the pH. The pH at 25°C was determined using the E* calculated for each titration. The concentrations of H^+ are in mol/kg and are on the seawater scale ($[H^+]_T$

$= [H^+]_F + [HSO_4^-] + [HF]$). The electrodes were calibrated before going to sea by making titrations of 0.7 M NaCl with 0.25 M HCl (with 0.45 M NaCl) and TRIS buffer. The TRIS buffer was made up in the laboratory and calibrated with hydrogen electrode system before the cruise (Millero, 1986). The total seawater pH scale (Dickson, 1984) was used for all the measurements.

2.2.4 Dissolved Organic Carbon Methods

A Shimadzu™ DOC-5000 Total Organic Carbon Analyzer with the ASI-5000™ Automated Sample Injector was purchased for use on this cruise. This is an automated DOC instrument utilizing high temperature catalytic combustion (680°C) and non-dispersive infrared detection. It was installed on the ship and operated in NPOC mode (Non-purgable organic carbon) which means the "DOC" reported does not include volatile species. The only modification to the standard operating procedures for this commercial instrument was that "zero" (high-purity) oxygen was used instead of compressed air for the carrier stream.

The water column was sampled using Niskin™ water sampling bottles mounted on the 24 bottle rosette/CTD package that was described in the Hydrographic Methods section of this report. Samples for the DOC analysis were collected on deck in the 40-mL glass vials which fit the autosampler carousel. The samples were free-flowed from the Niskin™ bottle into the vial. Care was taken so that the inner surfaces of the vial and the water stream from the valve did not come into contact with any other surfaces. Each vial was filled and rinsed with sample three times, before being filled for analysis. The sample was immediately acidified to pH of 2 by addition of vacuum-distilled HCl, and sealed with Parafilm™ and a plastic snap ring. Sample levels were kept far enough below the top of the vial to insure that the water did not come into contact with the Parafilm™ during subsequent handling.

The samples were moved to the autosampler for immediate processing, or were stored at 4°C if a delay was necessary. The autosampler was set to purge each sample of inorganic carbon species by bubbling high purity oxygen through the sample for five minutes immediately before the analysis. The gas stream continued to be introduced during the analytical process, except when the water was being transferred to the instrument by the sipper. Samples and standards were run in replicate, (usually six per determination). Peak area for each replicate was recorded for later statistical handling.

Data calibrations on this cruise were produced by the standard addition method; three levels of known concentrations of KHP (Potassium Hydrogen Phthalate) were added to aliquots of a sample and the series run as if they were discrete samples. This procedure insures that matrix effects and artifacts due to handling of the samples are reflected in the calibrations. The single largest problem in calibrating the DOC instrument is evaluating the "instrument blank", the part of the reported signal which is NOT due to organic carbon. Low organic carbon water produced by redistillation of research grade distilled water over potassium permanganate, and batch UV-irradiated Gulf Steam seawater were run daily as samples to monitor this apparent blank (which was usually <4 µmol/L). Data tables with the discrete carbon-related data from this study are in Appendix B.

2.3 PRODUCTIVITY

2.3.1 Methods for Chlorophyll Measurements

Chlorophyll a concentrations were determined from duplicate 250-mL and 300-mL aliquots taken from a flow-through system and Go-Flo™ hydrographic casts respectively. The samples were filtered through Whatman GF/F filters which were then placed in 5 mL of a 40/60 (vol.:vol.) mixture of dimethyl sulfoxide (DMSO):90% Acetone solution and placed in the dark for one hour. This is a modification of the Shoaf and Lium, (1976) and Burnison, (1980) procedure. The fluorescence of the DMSO/Acetone extracts were measured at sea with a Turner Designs™ fluorometer model 111. The fluorometer was calibrated at sea with Sigma™ chlorophyll a, following the method of Parsons et al., (1984).

Water was collected hourly from the seawater flow-through system for chlorophyll a analysis. The intake valve is located in the bow of the ship at about 3 m below the surface. The Go-Flo™ hydrographic casts for both chlorophyll a and production rate measurements were made using 10-L Go-Flo™ bottles mounted on Kevlar hydrowire. Six sampling depths were selected according to light levels. Seawater samples were collected at 100, 50, 30, 15, 6, and 1 % of the incident surface irradiance (I_0). Diffuse vertical attenuation coefficients (K), in reciprocal meters, were estimated at all stations using a Secchi disk and the relation K = 1.4/Secchi depth. Photosynthetically available radiation (PAR) was also measured with depth using a Lambda Instruments™ LI-190S 4π spherical collector. Calculations for this measurement were done after each cast. All Go-Flo™ hydrocasts were performed within a three hour time window (between 7-10 am local), to help ensure uniform sampling conditions throughout the cruise. Contour plots of chlorophyll a values from Leg 1 of this cruise are found in Figure 7.

2.3.2 Methods for Productivity Measurements

Productivity measurements were made using the ^{14}Carbon method, as originally described by Steemann-Nielsen (1952), with modifications by Fitzwater et al. (1982) to minimize trace metal contamination. All materials were acid-cleaned in dilute (0.1 N) HCl, then rinsed with Milli-Q™ water. Incubation bottles were rinsed with the seawater sample prior to being filled. Samples were collected from the Go-Flo bottles in darkened 2-L acid-cleaned polycarbonate bottles. Approximately 250 mL of sample was transferred to each of three (two light, one dark) acid cleaned polycarbonate bottles and inoculated with 5 µCi of $NaH^{14}CO_3$ with acid cleaned Eppendorf™ pipettes. The Amersham-Serle™ isotope (^{14}C-bicarbonate) was prepared in a carrier solution of 0.3 g/L Baker Instra Analyzed™ $NaHCO_3$. The three incubation bottles were then placed into small Plexiglas™ tubes that were wrapped with blue film, (#TS-51-xsr from Madico Inc.). The number of wraps were calibrated to simulate the 100, 50, 30, 15, 6, and 1 % of the incident surface I_0 , corresponding to optical depths listed in Appendix C of 0, -0.69, -1.20, -1.90, -2.81, and -4.60. The samples were incubated on deck for 24 hours in clear Plexiglas™ cylinders filled with circulating surface seawater. The samples were then taken to the lab where they were filtered, in

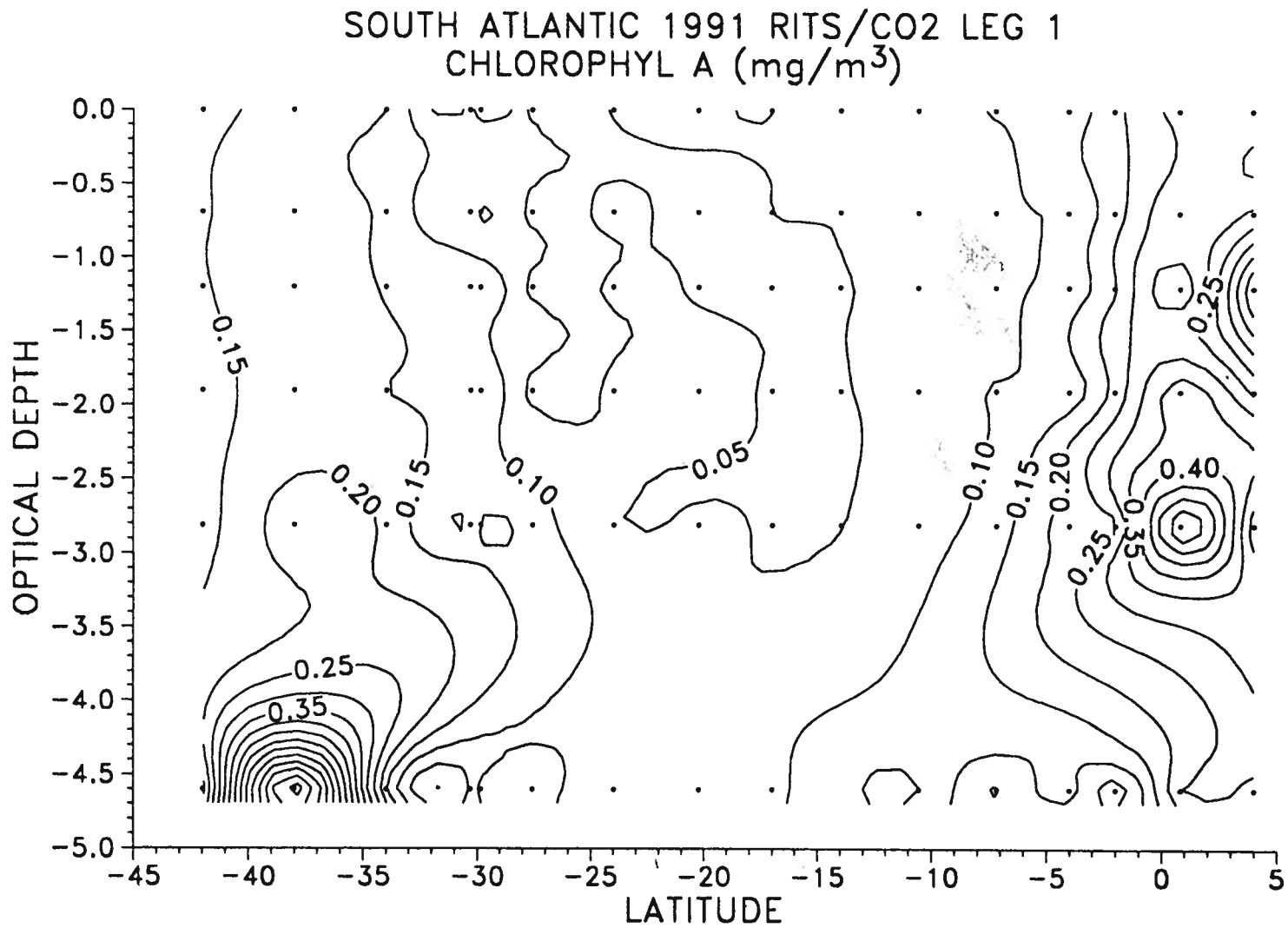

Figure 7: Chlorophyll a cross section from Leg 1. Dots represent sample locations. Contour interval = 0.05 mg/m^3.

darkness, through Whatman GF/F filters, and rinsed with filtered seawater without being exposed to air.

Filtrations were performed under a pressure differential of <50 mm Hg to minimize cell breakage (Goldman and Dennett, 1985). The filters were transferred to Nalgene™ scintillation bags, and acidified with 0.5N HCl. After one hour, a 3-mL aliquot of Universol™ (ICN radiochemicals) scintillation cocktail was added to each bag as described in Hitchcock (1986).

Isotope activity of the samples was measured aboard ship with a Tracor model 300 scintillation counter. Production rate (mg $C/m^3/h^1$) was calculated from the mean value of the two light bottles minus the dark bottle activity. A contour plot of productivity measurements from Leg 1 of this cruise is presented in Figure 8. Productivity data tables from this study are in Appendix C.

2.4 UNDERWAY MEASUREMENT METHODS

Sampling

During Legs 1 and 2 of the S. ATL-91 cruise, underway measurements of fugacity of CO_2 in surface seawater, (fCO_2w), and air, (fCO_2a) were performed with an automated system. The seawater intake was located in the ship's bow bubble, approximately 3 m below the water line. A thermosalinograph, which records temperature and salinity was placed in a shunt off the main seawater intake line, in the bow bubble as well. Since there was evidence of seawater being heated prior to its reaching the thermosalinograph, water temperature was acquired from a hull mounted probe used for acoustic Doppler current profile data reduction. On Leg 2, discrete samples were taken from the underway system at six-hour intervals and analyzed for TCO_2, fCO_2, and major nutrients in addition to the continuous fCO_2 measurements. Cruise tracks from Legs 1 and 2, with the range of fCO_2w-fCO_2a values represented by stick diagrams, are presented in Figures 9 and 10. The underway carbon data is presented in tables in Appendix D.

2.4.1 Underway fCO_2 Measurements

The shipboard automated underway fCO_2 system runs on an hourly cycle during which three gas standards, a headspace sample from the equilibrator, and an ambient air sample are analyzed. The equilibrator, which was designed by R. Weiss of S.I.O., is made from a large (58 cm H x 23 cm ID) Plexiglas™ chamber. The equilibrator has a shower head in the top through which surface seawater is forced at a rate of 20-30 L/min. The water spray through the 16-L head space and the turbulence created by the jets impinging on the surface of 8-L of water, cause the gases in water and headspace to equilibrate. A drain 20 cm from the bottom of the equilibrator discharges excess water from the system over the side of the ship. Air in the equilibrator head space is circulated with an Aircadet™ pump (model 7530-40) at 6 L/min in a closed loop through a mass flow meter (MFM) and back pressure regulator. During 23 minutes of each hour, 75 mL/min is teed off upstream of the back pressure regulator through a mass flow controller (MFC) and into the 12-mL sample cell of a Licor™ (model 6251) non-dispersive infrared analyzer. The air removed from the equilibrator through the IR analyzer is replaced with ambient air through an intake/vent line that runs to the outside of the ship. The

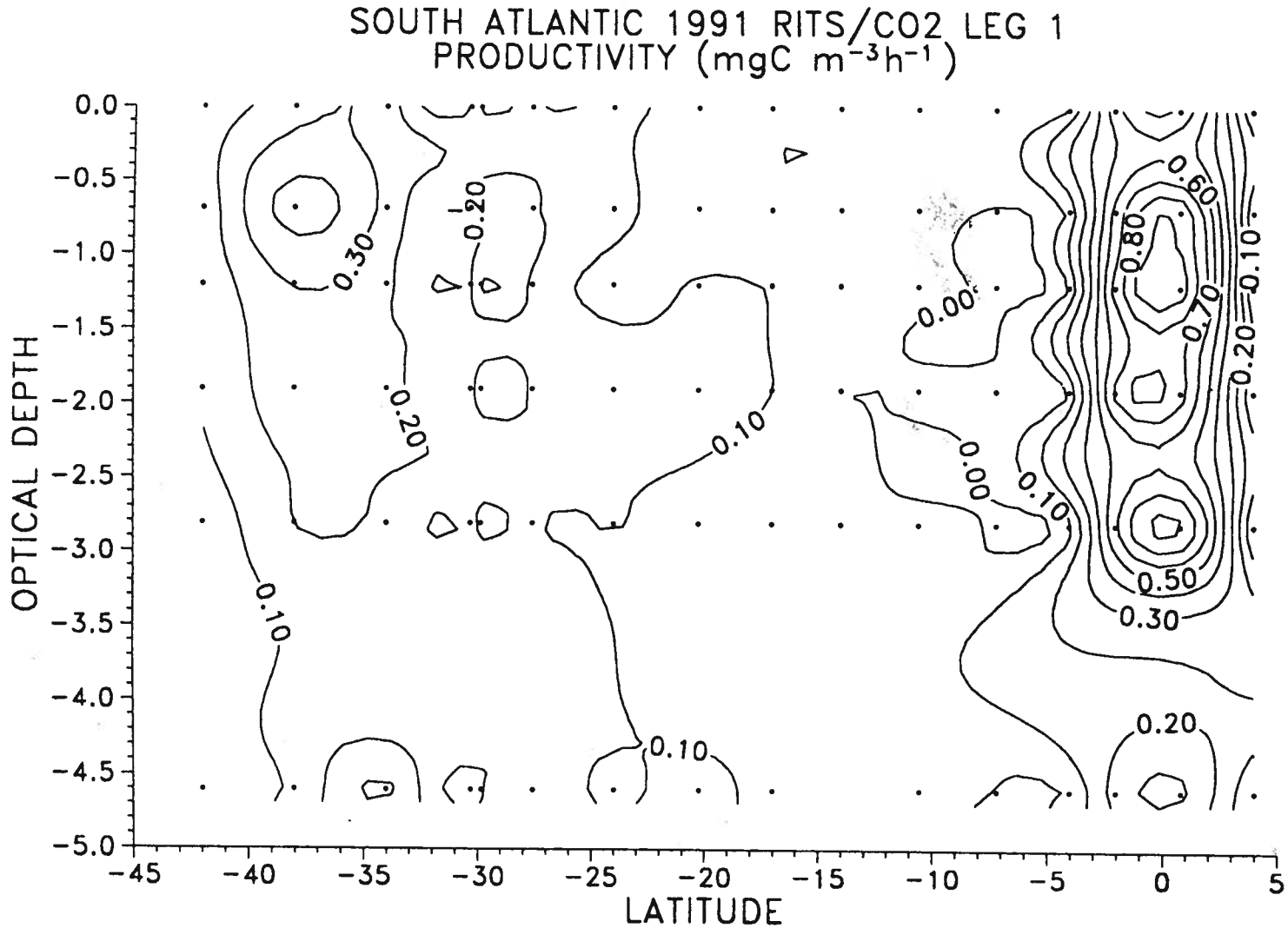

Figure 8: Productivity cross section from Leg 1. Dots represent sample locations. Contour interval = 0.1 mg C m^{-3} h^{-1}

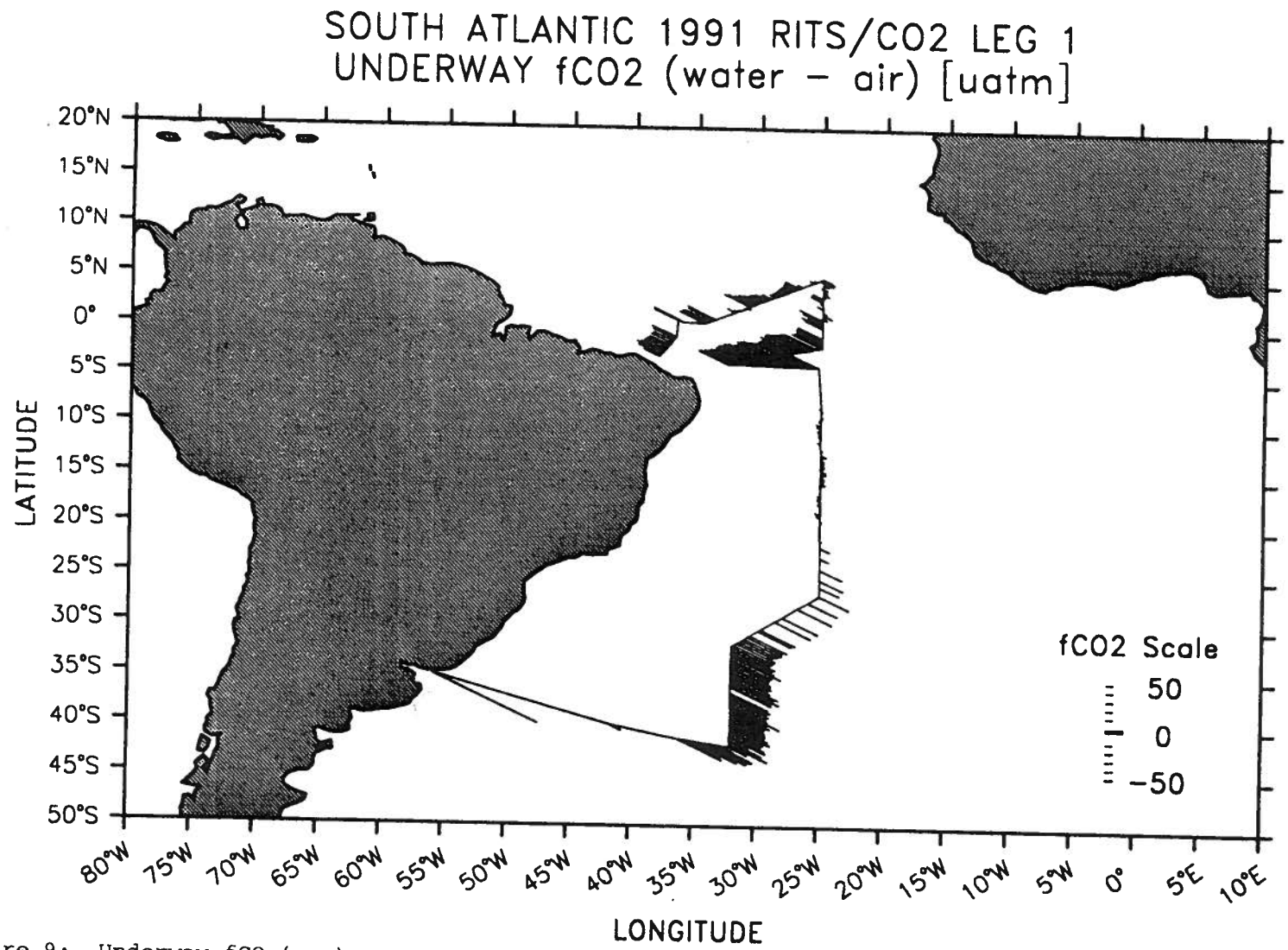

Figure 9: Underway fCO_2(w-a) measurements from Leg 1. Stick height, above, or to the left of track line equals fCO_2(w-a). Negative fCO_2(w-a) values depict sinks and appear below, or to the right of the track line.

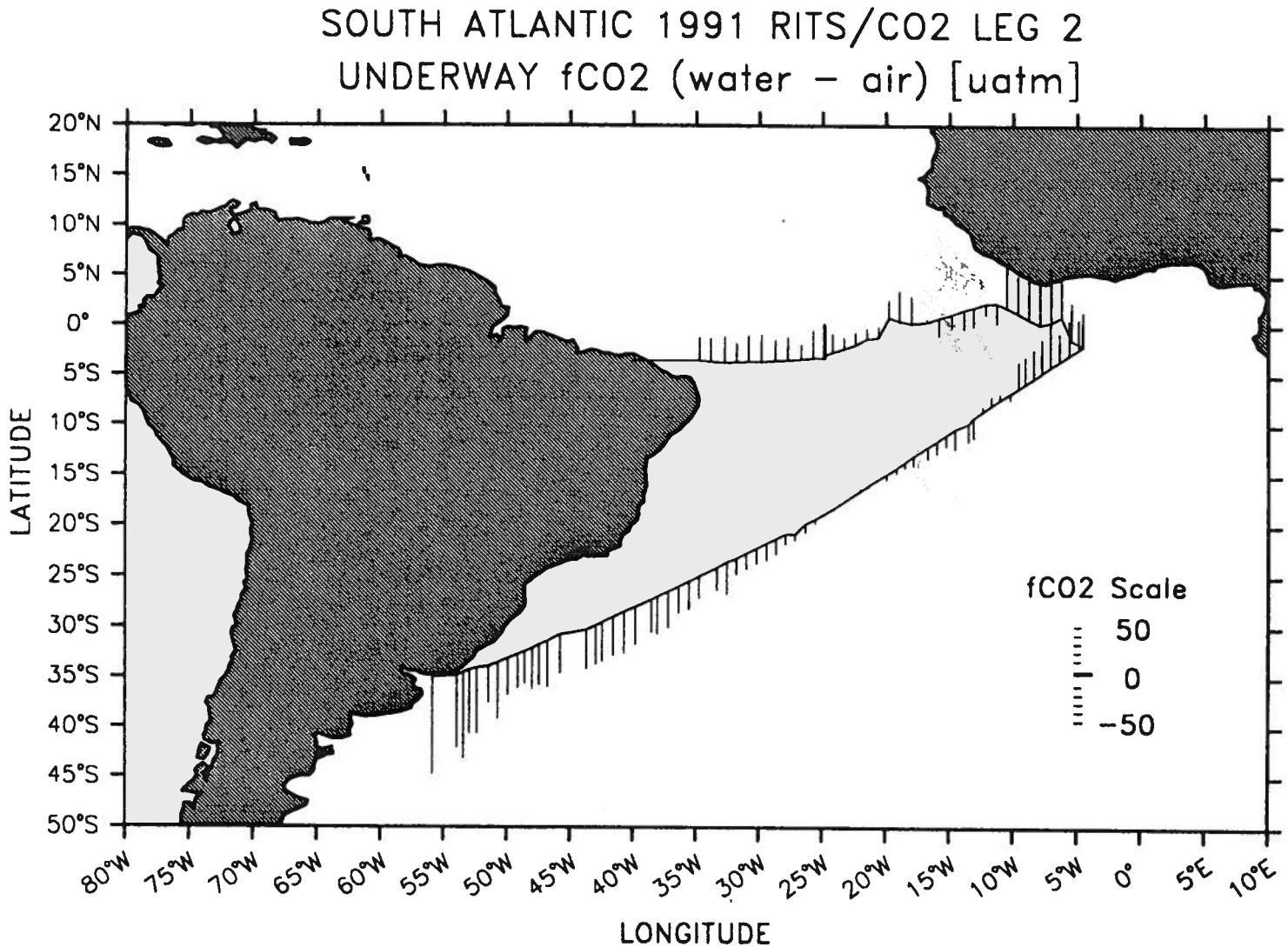

Figure 10: Underway fCO_2(w-a) measurements from Leg 2. Stick height above track line equals fCO_2(w-a). Negative fCO_2(w-a) values appear below the track line.

introduction of the ambient air into the equilibrator chamber during sampling of the headspace results in an error in the determination of the equilibrated head space composition no greater than one micro atmosphere. The total time required to fully replace equilibrator air through the ambient air intake/vent line is 213 minutes. The headspace equilibration time, as determined by return to equilibrium after perturbation by adding nitrogen to the head space, is approximately 2.5 minutes. The intake/vent line also assures that the pressure in the head space of the equilibrator remains at atmospheric value.

During underway sampling operations ambient air is drawn through 100 m of 0.37 cm OD Dekoron™ tubing from the bow mast of the ship at a rate of 6 to 8 L/min. During 22 minutes of each hour, ambient air mixing ratios are measured in the IR analyzer by teeing off the air line at a flow rate of 75 mL/min. Compressed gas standards with nominal mixing ratios of 300, 350, and 400 ppm (parts per million by volume) flow through the IR analyzer for five minutes each hour at 75 mL/min for calibration. The 300 ppm standard flows continuously at 50 mL/min through the reference side of the IR analyzer (detector) as well. All reference tanks undergo a pre- and post-cruise calibration at CMDL against standards certified by the World Meteorological Organization (WMO).

The IR analyzer/detector's voltage output is measured once per second with a Keithley™ (model 195 A) digital multimeter; 1-minute averages are calculated and stored on the hard disk of an MS-DOS computer. The MFC's connected to the reference and sample inlet of the IR, the MFM's measurement of the intake rate of ambient air and recirculation rate of the headspace of the equilibrator, the back pressure in the air and equilibrated air lines, and two thermistors readings of the water temperature in the equilibrator are all logged at 1-minute intervals as well.

fCO_2 Calculations

The mixing ratios of ambient air and equilibrated headspace air are calculated by fitting a second-order polynomial fit through the response of the detector versus mixing ratio of the standards. Due to the need for sufficient time to flush the sample cell and lines leading to the IR from the previous gas, the first three minutes of each analysis run are not used in the calculations. The subsequent one-minute readings for each analysis are averaged, yielding one 19-minute average ambient air mixing ratio and one 20-minute average equilibrated headspace mixing ratio per hour. Typical standard deviations for air values are ± 0.1 ppm and for equilibrated headspace ± 0.3 ppm.

Mixing ratios of dried equilibrated headspace and air must be converted to fugacity of CO_2 in water and water saturated air in order to determine the driving force for the air-sea CO_2 flux. For ambient air, assuming 100% water vapor content, the conversion is:

$$fCO_2a = XCO_2a\ (P-pH_2O)\ \exp(B11 + 2\ \delta 12)\ P/RT \qquad (1)$$

where pH_2O is the water vapor pressure at the sea surface temperature, and P is the atmospheric pressure. The exponential term is the fugacity correction where B11 is the second virial coefficient of pure CO_2 ($B11=-1636.75 + 12.0408\ T - 0.0327957\ T2 + 3.16528 \times 10^{-5}\ T3$) and $\delta 12$ ($= 57.7 - 0.118\ T$) is the correction for an air-CO_2 mixture (Weiss,

1974). The calculation for the fugacity in water includes an empirical temperature correction term for the increase of fCO_2 due to heating ($dfCO_2w/dT$ = 4.23%/ °C, D. Chipman and T. Takahashi, personal communication), of the water from passing through the pump and through 5 cm ID PVC tubing within the ship. The water in the equilibrator is typically 0.3 °C warmer than sea surface temperature. The fugacity in water is calculated according to:

$$fCO_2w =$$

$$XCO_2w\ (P-pH_2Oeq)\ (\exp[(Tsw - Teq)\ 0.0428])\ \exp(B11 + 2\ \sigma 12)\ P/RT \quad (2)$$

where pH_2Oeq is the water vapor pressure at the temperature of the water in the equilibrator, Tsw is the temperature of the surface seawater, Teq is the temperature of the water in the equilibrator.

3. ACKNOWLEDGMENTS

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APPENDIX A: Index of Measurements and Units

List of measurements

Column heading or abbreviation	Explanation
Hydrography, Appendix B	
TCO_2(coul.)	dissolved inorganic carbon dioxide (coulometer)
TCO_2(titr.)	dissolved inorganic carbon dioxide (titrated)
fCO_2,20	fugacity of CO_2 at 20 degrees
TAlk	total alkalinity
calc.	means the value has been calculated
coul.	coulometer.
DOC	dissolved organic carbon
Productivity measurements, Appendix C	
OPT DEPTH	optical depth
PROD_RATE	organic carbon production rate
CARB_DAY	organic carbon production per day (= PROD_RATE*24)
CHLORO_A	chlorophyll a
CHLOR_DAY	chlorophyll production per day
TOT_PIGS	chlorophyll a + phaopigments
INCUB-TIME	incubation time for productivity measurements
Underway measurements, Appendix D	
Lat	latitude in decimal degrees
Lon	longitude in decimal degrees
XCO2,a	the volume fraction of CO_2 in air
XCO2,w	the volume fraction of CO_2 in equilibrator headspace
fCO2,w-a	fugacity of CO_2 (water value minus the air value)
SST	sea surface temperature
SST-Eq.T	sea surface Temperature-Equilibrator temperature
Sal(CTD)	salinity from CTD measurement at stations
Sal(TSG)	salinity measurement from thermosalinograph

Hydrographic and Carbon System parameters, Appendix B

Parameter	Units	Unit spelled out
Depth	m	meters
Pres.	db	decibars
Temp.	°C	degrees centigrade
Pot. T.	°C	degrees centigrade
Salinity	(none)	salinity
Sigma theta	(none)	potential density
Oxygen	mL/L	milliliters per liter
NO_2	umol/L	micro moles per liter
NO_3	umol/L	micro moles per liter
SiO_4	umol/L	micro moles per liter
TCO_2 (coul.)	umol/Kg	micro moles per kilogram
fCO_2 (20 deg.)	uatm	micro atmospheres at 20 °C
pH	(none)	
TAlk	uEq/Kg	micro equivalents per kilogram
TCO_2 (titr.)	umol/Kg	micro moles per kilogram
DOC	umol/L	micro moles per liter

Productivity parameters, Appendix C

Parameter	Units	Unit spelled out
SALINITY	(none)	salinity
INCUB_TIME	HRS	hours
DEPTH	m	meters
OPT DEPTH	(none)	optical depth
PROD_RATE	mgC/m^3/h^1	milligrams of carbon per m^3 per hr
CARB_DAY	mg/m^3	milligrams per cubic meter
CHLORO_A	mg/m^3	milligrams per cubic meter
CHLORO_DAY	mg/m^3	milligrams per cubic meter
TOT_PIGS	mg/m^3	milligrams per cubic meter

Underway parameters, Appendix D

Parameter	Units	Unit spelled out
Lat	Dec. Deg.	decimal degrees
Lon	Dec. Deg.	decimal degrees
XCO2,a	ppm	parts per million
XCO_2,w	ppm	parts per million
SST	deg. C	degrees centigrade
SST-Eq.T	deg. C	degrees centigrade
Sal(CTD)	none	
Pressure	mb	millibars
fCO_2,w	uatm	microatmospheres
fCO_2,w-a	uatm	microatmospheres

APPENDIX B: Station Data for Hydrography and Carbon Parameters

Casts are presented by cruise leg and increasing cast number. The cruise leg number, the station number, geographic coordinates, operation number, date and bottom depth are shown at the top of each data table. Data values that are suspect for various reasons are italicized. A blank space is left when either no data was collected, or the value was known to be in error. See Appendix A for explanation of column headings and abbreviations. All coordinates are in fractional degrees with negative values indicating south or west.

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911930001.0	Latitude	-0.66
Station	1	Date	7/12/1991	Longitude	-36.51
Cast	1	Time (GMT)	630	Bottom Depth	4544

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
101	4496	4416	1.030	0.670	27.865	34.749						933.4	2363	2271			
102	4496	4416	1.030	0.670	27.865	34.748	5.60				2243.5	933.0				2370.9	
103	3595	3538	2.482	2.180	27.887	34.910					2172.7	733.5	2322	2173	7.712	2335.3	
104	3594	3537	2.484	2.182	27.888	34.935	5.96				2171.1	726.9				2337.1	
105	3596	3538	2.482	2.180	27.887	34.924					2174.9	733.2				2335.4	
106	3595	3538	2.485	2.183	27.887	34.912	6.01				2175.8	721.6				2337.9	
107	2995	2951	2.782	2.536	27.873	34.931					2172.6	733.4	2310	2173		2335.6	
108	2585	2550	2.962	2.754	27.860	34.940	5.88				2171.2	732.0	2331	2178	7.708	2334.5	
109	2385	2354	3.087	2.897	27.853	34.957					2169.0	741.4				2325.1	
110	1994	1969	3.623	3.462	27.818	34.971					2169.9	729.6				2336.3	
111	1491	1474															
112	1351	1336	4.527	4.415	27.689	34.933					2179.2	836.4	2315	2226		2322.2	
113	1351	1337	4.527	4.415	27.688	34.931					2181.3	838.0				2321.8	
114	1351	1336	4.527	4.415	27.689												
115	1352	1337	4.528	4.416	27.688	34.932					2182.2						
116	999	989	4.521	4.441	27.467	34.657	4.01				2214.6		2305	2223			
117	800	793	4.743	4.679	27.330	34.519	3.80				2215.7	1141.0	2307	2226	7.566	2307.9	
118	499	495	7.029	6.981	27.116	34.612					2200.5	1087.0				2300.5	
119	401	398	8.995	8.951	26.984	34.818					2208.2	1110.9				2302.8	
120	300	297	10.558	10.522	26.848	34.982	3.07				2179.8	881.9	2286	2178	7.740	2313.2	
121	202	201	11.453	11.427	26.755	35.073	3.23				2161.6	746.1	2318	2180	7.706	2322.0	
122	104	103	17.886	17.868	26.016	35.913	3.87				2118.7	478.8	2335	2106	7.561	2369.4	
123	55	55	26.752	26.739	23.655	36.130					2015.6	285.9	2358	2035	8.043	2376.8	
124	3	2	26.851	26.850	23.620	36.131	4.59				2016.8	282.7	2368	2038	8.058	2381.6	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 2
Cast 2

Operation # 0911930003.0
Date 7/12/1991
Time (GMT) 1841

Latitude -0.46
Longitude -35.18
Bottom Depth 4547

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
201	4536	4454	1.006	0.642	27.865	34.744	5.21										
202	4537	4455	1.006	0.642	27.864	34.745	5.21										
203	4536	4455	1.006	0.642	27.864	34.744	5.23										
204	4536	4454	1.006	0.642	27.865		5.21										
205	4536	4454	1.006	0.642	27.865		5.22										
206	4536	4454	1.006	0.642	27.865	*34.754*	5.21										
207	4536	4454	1.006	0.642	27.865	34.747	5.23										
208	4535	4454	1.006	0.642	27.865	34.744	5.24										
209	4533	4452	1.006	0.642	27.865		5.21										
210	4533	4451	1.006	0.642	27.864	34.746	5.20										
211	4533	4452	1.006	0.642	27.866												
212	4532	4451	1.006	0.642	27.865	34.757	5.21										
213	717	711	5.069	5.010	27.265	34.482	*3.78*										
214	719	712	5.069	5.010	27.266	34.485	3.66										
215	720	713	5.061	5.002	27.267	*34.511*	3.68										
216	719	712	5.067	5.008	27.265	34.481	3.68										
217	720	713	5.060	5.001	27.267	34.487	3.65										
218	720	714	5.061	5.002	27.266	34.483	*3.90*										

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911960019.0	Latitude	5.00
Station	3	Date	7/15/1991	Longitude	-24.97
Cast	3	Time (GMT)	443	Bottom Depth	4163

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
301	1005	995	4.820	4.737	27.454	*34.687*	3.33		34.4	29.2	2224.3	*1133.2*	2300	2211	7.524	2318.3	45.2
302	1005	995	4.810	4.727	27.456	34.685	3.36	0.0	34.4	28.2	2226.1	1130.4				2318.7	
303	951	942	4.948	4.869	27.413	34.652	3.16	0.0	35.8	28.6	2228.5	1185.1	2299	2211		2314.8	
304	901	893	5.027	4.952	27.388	34.633	3.06	0.0	36.8	28.9	2230.9	1212.4	2301	2238	7.506	2313.8	
305	850	842	5.231	5.159	27.353	*34.637*	2.93	0.0	37.3	28.5	2232.0	1239.0	2305	2238		2311.8	
306	850	842	5.224	5.152	27.355	34.618	2.92	0.0	37.2	29.7	2232.6	1239.6				2311.8	
307	800	792	5.415	5.347	27.323	34.609	2.80	0.0	37.6	27.7		1255.6	2279	2226			46.1
308	751	744	5.622	5.557	27.290	34.600	2.76	0.0	37.6	26.1	2231.5		2313	2256	7.495		
309	702	695	5.690	5.629	27.261												
310	641	635	6.107	6.050	27.230	34.600	2.80	0.0	38.0	24.4	2224.5	1217.4	2282	2212		2306.1	51.3
311	580	575	6.695	6.641	27.184	34.640	2.64	0.0	36.1	21.4	2225.2	1211.5	2310	2248	7.508	2307.7	
312	531	526	7.182	7.131	27.153	34.684	2.47	0.0	35.5	19.4	2225.9	1217.7	2283	2214		2307.8	54.4
313	447	443	8.499	8.451	27.072	34.829	1.98	0.0	35.6	17.0	2228.2	1252.2	2309	2244	7.520	2306.5	
314	401	397	9.672	9.626	26.973	34.946	2.09	0.0	32.6	14.1	2220.4	1141.9	2281	2200		2312.6	
315	352	349	10.566	10.523	26.890	35.037	1.95	0.0	31.2	12.7	2217.2	1104.7	2310	2230	7.557	2314.6	42.9
316	306	303	11.462	11.423	26.796	35.124	*2.22*	0.0	27.7	10.5	2202.5	956.0				2322.4	
317	266	264	11.891	11.856	26.737	*35.204*											
318	221	220	12.393	12.363	26.678	35.204	3.12	0.0	21.4	7.5	2168.4	747.5	2307	2263		2328.3	55.2
319	183	182	12.992	12.967	26.616	35.280	3.07	0.0	19.7	7.0	2168.0	721.7	2288	2216		2334.9	
320	135	134	13.918	13.899	26.519	35.401	2.83	0.0	20.2	6.1	2171.4	718.5	2354	2258		2340.1	55.4
321	103	102	15.198	15.182	26.345	*35.543*	2.68	0.0	18.6	5.4	2170.0	690.5				2346.8	61.7
322	79	79	19.708	19.693	25.521	35.887	3.44	0.5	7.6	3.1	2120.3	475.2				2371.1	51.6
323	43	43	27.670	27.660	22.867	35.478	4.72	0.6	0.0	0.0	1954.3	252.0	2314	1962	8.102	2322.1	78.4
324	3	3	27.793	27.792	22.656	*35.236*	4.62	0.0	0.0	0.0	1943.9	243.1	2303	1891	8.106	2326.2	79.0

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911960022.0	Latitude	3.99
Station	4	Date	7/15/1991	Longitude	-24.97
Cast	4	Time (GMT)	1253	Bottom Depth	4420

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
401	4023	3955	2.342	1.996	27.883	34.889	5.58		21.9	46.4	2197.6	764.8	2317	2183	7.701	2355.7	50.8
402	4023	3955	2.342	1.996	27.884	34.889	5.63		21.8	47.1	2196.0	768.6				2354.8	
403	3689	3630	2.387	2.077	27.883	34.894	5.65		21.8	43.6	2192.5	766.3				2349.8	59.6
404	3190	3143	2.585	2.324	27.875	34.910	5.55		21.5	39.5	2188.3		2335	2201	7.701		52.9
405	2790	2750	2.717	2.494	27.869	*34.939*											
406	2391	2359	3.007	2.818	27.856	*34.978*	5.63		20.6	30.1	2175.1	759.1	2321	2229	7.410	2332.0	46.1
407	1990	1966	3.466	3.307	27.823	*34.969*	5.53		21.0	24.2	2174.0	756.0	2318	2182	7.696	2331.6	46.8
408	1682	1662	3.982	3.845	27.779	34.970	5.40		20.9	19.9	2172.2	774.3	2310	2231	7.389	2325.1	
409	1591	1573	4.162	4.031	27.759	*34.924*	5.28		21.2	19.0	2174.2	800.8	2314	2190	7.678	2321.3	50.8
410	1393	1377	4.396	4.281	27.699		4.78		23.7	21.0	2188.9	857.2	2299	2229	7.369	2325.5	46.9
411	1193	1180	4.593	4.495	27.599	34.835	4.11		28.0	25.8	2206.4	981.1	2329	2235	7.596	2321.5	46.3
412	994	984	4.696	4.615	27.449	34.651	3.51		34.3	30.4	2224.8	1135.8	2305	2237	7.561	2317.4	49.6
413	846	838	5.100	5.030	27.353	34.597	3.08		34.4	29.5	2229.8	1227.6	2282	2263	7.247	2310.6	48.9
414	744	737	5.291	5.229	27.297	34.563	3.20		34.1	28.5	2222.3	1203.7				2307.5	49.3
415	745	738	5.293	5.231	27.297	34.551	3.17		34.3	28.4	2225.4	1205.0				2307.4	51.0
416	646	640	5.965	5.908	27.238	34.581	2.85		34.1	25.4	2220.9	1246.9	2273	2288	7.289	2298.4	
417	495	491	7.607	7.558	27.115	*34.726*	2.39		33.2	19.6	2219.4	1229.9				2299.2	43.3
418	335	332	10.869	10.828	26.867	35.075	1.58				2226.5	1170.7	2302	2233	7.539	2315.9	
419	267	264	12.677	12.641	26.661	*35.246*	2.47		30.5	12.8	2179.9	847.7	2328	2187	7.667	2318.5	76.7
420	199	197	13.799	13.770	26.534	35.382	2.29		22.5	8.8	2189.4	*794.6*	2325	2243	7.401	2341.4	55.6
421	90	90	16.835	16.820	26.078	35.676	2.49		21.5	8.0	2164.7	673.1	2330	2185	7.724	2346.4	63.7
422	43	42	27.832	27.822	22.964	35.675	4.56		*16.5*	5.0	1970.6	252.7	2331	1977	8.097	2352.2	80.9
423	25	25	27.824	27.818	22.951	35.657	4.56				1965.8	252.0	2307	*2010*	7.800	2347.6	80.0
424	3	3	27.731	27.730	22.871	35.504	4.57				1960.2	248.0	2325	1980	8.114	2343.1	82.6

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911960031.0	Latitude	3.00
Station	5	Date	7/15/1991	Longitude	-25.00
Cast	5	Time (GMT)	1931	Bottom Depth	4361

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
501	997	987	4.540	4.460	27.451	34.643	3.54			21.9	2218.2	1124.4	2314	2227	7.287		
502	997	987	4.540	4.460	27.451	34.643	3.54	0.0				1124.6					
503	799	792	4.932	4.867	27.323	34.538	3.34				2237.3	1185.7	2308	2222	7.282	2323.9	
504	798	791	4.937	4.872	27.321	34.535	3.35	0.0	34.4	*29.0*		1182.2					
505	500	495	7.142	7.094	27.138	34.660					2214.1	1177.7	2293	2214	7.552	2300.0	
506	500	495	7.150	7.102	27.139	34.668		0.0	32.1	19.3		1173.0					
507	348	345	10.259	10.218	26.904	*35.001*	1.95				2219.6	1129.4				2313.7	
508	348	345	10.252	10.211	26.902	34.987	2.03	0.0				1124.1					
509	274	272	12.652	12.615	26.662	35.251	2.51				2182.9	836.0	2310	2183	7.664	2323.9	
510	274	272	12.631	12.594	26.663	35.243	2.43	0.0	23.1	7.1		850.8					
511	225	223	13.387	13.355	26.582	35.336	2.18				2194.0	857.1	2308	2176	7.399	2332.8	
512	224	222	13.396	13.364	26.582	35.338	2.16	0.0	18.6	5.5		858.6					
513	176	175	14.529	14.503	26.449	35.478	2.75				2166.8	704.7	2327	2175	7.735	2338.9	
514	176	175	14.528	14.502	26.449	35.477	2.76	0.0	19.2	5.1		703.4					
515	127	126	15.690	15.670	26.294	35.611	2.22				2182.0	747.2	2336	2197	7.705	2345.5	
516	126	125	15.696	15.676	26.292	35.607	*2.36*	0.0	18.5	4.3		748.1					
517	103	102	16.389	16.372	26.173	35.664	2.17				2179.2	729.5	2311	2174	7.436	2345.3	
518	103	102	16.421	16.404	26.167	35.666	2.16	0.2	2.7	0.8		736.1					
519	76	75	21.762	21.747	24.988	35.919	3.56				2109.4		2343	2096	7.625		
520	76	75	21.768	21.753	24.992	35.916	3.59	0.0	0.0	0.0	2109.4	434.9				2379.4	
521	41	41	27.291	27.281	23.121	35.662				0.9	1980.4	*435.3*	2330	1988	8.083	*2221.3*	
522	40	40	27.288	27.279	23.121	35.651		0.0	0.0	0.0		265.7					
523	4	3	27.291	27.290	23.110	35.641	4.58				1981.2	266.5	2320	1992	8.077	2349.9	
524	3	3	27.286	27.285	23.112	35.645	4.60	0.0	0.0	0.0		263.6					

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911970034.0	Latitude	2.00
Station	6	Date	7/16/1991	Longitude	-25.01
Cast	6	Time (GMT)	228	Bottom Depth	3963

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
601	3899	3835	2.360	2.027	27.881	34.897	5.60	0.0			2197.1	764.8	2338	2200	7.429	2355.3	
602	3499	3444	2.477	2.185	27.877	34.900	5.66	0.0	20.3	39.0	2190.7	751.2	2336	2200	7.698	2351.5	
603	3099	3054	2.593	2.341	27.872	34.912		0.0	20.6	36.7	2181.8	757.1	2340	2181	7.433	2340.0	
604	3100	3054	2.594	2.342	27.872	34.910	5.64	0.0	21.0	37.3	2187.9	750.6				2348.5	
605	2598	2563	2.875	2.668	27.858	34.930		0.0			2180.6	745.2	2326	2191	7.695	2341.6	
606	2200	2172	3.229	3.054	27.839	34.949	5.71	0.0	19.6	24.1	2173.4	739.3	2334	2163	7.437	2335.1	
607	1801	1779	3.769	3.624	27.800	34.973		0.0	19.6	16.5	2170.5	745.0	2316	2181	7.703	2330.4	
608	1598	1580	4.083	3.953	27.764	34.966	5.33	0.0	20.0	16.1	2175.2	772.6	2320	2158	7.438	2328.9	
609	1400	1385	4.429	4.313	27.703												
610	1202	1190	4.430	4.314	27.703	34.937	4.89	0.0	21.9	17.5	2182.7	832.8				2323.6	
611	1000	990	4.679	4.579	27.626	34.877	4.37	0.0	24.7	20.6	2195.5	912.2	2306	2205	7.654	2321.9	
612	803	795	4.570	4.490	27.432	34.620	3.65	0.0	31.4	28.8	2219.0	1115.8	2303	2196	7.370	2313.7	46.5
613	704	697	4.933	4.868	27.311	34.521	3.56	0.0	32.2	28.5	2218.2	1152.3	2304	2233	7.546	2307.5	
614	704	697	5.274	5.215	27.271	34.521	3.45	0.0	32.4	26.7	2214.9	1143.1				2305.2	60.3
615	503	499	7.550	7.500	27.109	34.699	2.78	0.0	31.7	17.5	2207.8	1126.5	2292	2192	7.298	2300.2	
616	405	401	8.944	8.900	26.997	34.823	3.00	0.0	26.8	12.7	2197.1	983.9	2303	2205	7.596	2310.7	46.0
617	285	283	11.884	11.847	26.734	35.150	2.26	0.0	23.9	8.0	2196.3	936.3	2305	2178	7.360	2319.2	
618	225	223	13.063	13.032	26.612	35.291		0.0	21.9	6.4	2187.7	837.8	2310	2176	7.389	2329.3	56.7
619	224	223	13.085	13.054	26.609	35.292	2.37	0.0	20.6	7.2	2187.3	840.9				2328.7	
620	166	165	13.661	13.637	26.549	35.371	2.26	0.0			2188.6	834.5	2324	2172	7.398	2331.6	
621	87	86	19.810	19.794	25.403	35.767	3.20	*0.3*		5.8	2129.7	531.7	2345	2135	7.831	2355.8	
622	47	47	27.783	27.772	22.908	35.589	4.55	0.0		0.0	1971.3	256.0	2329	2011	7.806	2348.6	81.9
623	29	28	27.777	27.770	22.909			0.0	0.0	0.0							
624	4	4	27.769	27.768	22.909	35.580	4.67	0.0	0.0	0.0	1968.5	253.3	2329	1983	8.094	2348.1	75.7

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911970036.0	Latitude	1.00
Station	7	Date	7/16/1991	Longitude	-25.00
Cast	7	Time (GMT)	905	Bottom Depth	3604

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
701	999	989	4.502	4.422	27.438	34.619	3.64	0.0	29.9	29.8	2221.5	1091.8	2315	2235	7.604	2320.0	
702	799	792	4.908	4.843	27.318	*34.535*	*3.08*	0.0	30.9	28.7	2218.7	1141.2	2310	2240	7.514	2309.5	
703	500	496	7.173	7.125	27.112	34.630	3.07	0.0	29.6	18.6	2209.2	1053.0	2306	2230	7.600	2308.3	
704	350	347	9.560	9.520	26.941	34.882	2.48	0.0	26.2	12.5	2204.9	1028.8	2302	2214	7.575	2312.1	
705	251	249	11.585	11.553	26.770	35.131	2.07	0.0	24.4	9.8	2206.8	*989.2*	2306	2212	7.643	2321.6	
706	201	200	12.712	12.685	26.646	35.244	2.90	0.0	20.3	7.6	2183.2	821.0	2315	2198	7.662	2328.0	
707	176	174	13.463	13.438	26.564	35.334	3.44	0.0	19.1	6.4	2159.4	678.7	2319	2182	7.779	2331.7	
708	127	126	14.283	14.264	26.478	35.447	2.57	0.0	17.0	5.6	2177.7	739.5	2323	2188	7.697	2342.0	
709	101	101	15.698	15.682	26.301	35.627	2.84	0.0	13.9	4.3	2161.5	649.6	2342	2167	7.796	2349.6	
710	77	77	20.874	20.859	25.252	35.945	3.61	0.3	5.5	1.1	2107.1	437.4	2353	2118	7.899	2375.5	
711	44	43	24.197	24.188	24.241	35.851	4.42	0.0	0.8	0.0	2041.3	338.5	2346	2072	8.043	2360.4	
712	2	2	25.966	25.966	23.325	35.367	4.62	0.0	0.0	0.0	1982.5	290.5	2318	2003	8.044	2325.4	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 9
Cast 8

Operation #0911970045.0
Date 7/16/1991
Time (GMT) 1720

Latitude -0.00
Longitude -24.99
Bottom Depth 3573

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
801	3311	3261	2.590	2.316	27.875	34.911	5.71				2186.1	741.0	2334	2206	7.735	2348.9	
802	2796	2756	2.795	2.570	27.864	34.925	6.10				2176.1	743.1	2321	2189	7.686	2337.1	
803	2494	2460	3.005	2.806	27.854	34.938	5.93				2179.0	740.4	2317	2184	7.741	2341.3	
804	2194	2166	3.426	3.248	27.834	34.965	5.77					727.2	2307	2178	7.698		
805	1895	1873	3.689	3.536	27.813	34.974	5.71				2159.2	734.1	2306	2186	7.725	2320.4	
806	1593	1575	4.177	4.046	27.765	34.979	5.42	0.0	20.8	17.0	2163.9	758.5	2305	2189	7.667	2319.6	
807	1490	1474	4.398	4.274	27.746	*34.993*	5.33	0.0	20.7	16.9	2173.8	773.4	2315	2195	7.726	2327.2	
808	1198	1185	4.537	4.439	27.589	34.815	4.21	0.0	28.1	26.0	2197.5	953.4	2301	2212	7.596	2316.3	
809	751	744	4.912	4.851	27.305	34.513	3.55	0.0	34.9	30.6	2219.6	1148.1	2302	2245	7.570	2309.5	
810	500	496	7.084	7.036	27.115	34.619	3.04	0.0	32.6	20.1	*2200.3*	1109.1	2286	2217	7.568	2294.2	
811	400	397	8.953	8.909	26.987	34.814	2.50	0.0	31.7	15.6	2210.8	1110.2	2293	2219	7.594	2306.2	
812	375	371	9.289	9.247	26.965	34.853	2.49	0.0	30.6	15.2	2200.5	1077.6	2293	2212	7.566	2299.7	
813	351	348	9.824	9.783	26.921	34.913	2.32	0.0	31.1	14.5	2208.1	1071.9	2298	2212	7.625	2309.0	
814	302	300	11.353	11.315	26.785	35.086	2.01	0.0	29.8	12.3	2208.6	1038.0	2300	2210	7.585	2315.4	
815	260	258	12.707	12.672	26.647												
816	222	220	13.006	12.975	26.610	35.273	3.18	0.0	19.2	8.5	2161.8	708.1	2319	2171	7.735	2331.5	
817	180	178	13.407	13.382	26.571	35.326	3.37	0.0	17.8	7.3	2156.0	673.0	2332	2158	7.801	2335.2	
818	141	140	13.944	13.924	26.513	35.400	3.60	0.0	15.4	6.7	2147.5	612.9	2357	2156	7.852	2344.3	
819	102	101	16.248	16.232	26.258	35.732	3.84	0.7	9.8	4.7	2128.0	521.8	2348	2139	7.904	2357.8	
820	82	82	17.508	17.494	26.102	35.929	3.92	0.1	8.8	3.7	2121.1	470.2	2374	2119	7.948	2374.4	
821	63	63	21.054	21.042	25.396	36.209	4.10	0.3	4.9	2.4	2101.3	399.8	2359	2066	8.050	2392.5	
822	44	43	24.250	24.241	24.392	36.081	4.61	0.2	0.6	1.1	2045.8	*317.8*	2348	2036	8.040	2385.7	
823	23	23	24.846	24.841	24.029	35.844	4.74	0.0	0.0	1.0	2022.9	300.0	2341	2035	8.071	2370.3	
824	4	4	25.025	25.024	23.969	35.848	4.75	0.0	0.0	0.0	2018.9	297.1				2368.0	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0911980049.0	Latitude	-1.00
Station	10	Date	7/17/1991	Longitude	-25.00
Cast	9	Time (GMT)	133	Bottom Depth	3278

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
901	1043	1032	4.466	4.383	27.455	34.634	3.91	0.0	32.5	20.0	2216.4	1079.1	2304	2233	7.547	2316.3	48.3
902	1043	1033	4.466	4.383	27.455												
903	802	794	4.776	4.712	27.295	34.483	3.68	0.0	33.9	19.2	2213.3	1115.3	2295	2236	7.576	2307.1	45.0
904	801	794	4.778	4.714	27.295												
905	752	745	5.014	4.953	27.271	34.483	*4.41*	0.0	34.8	17.9	2211.4	1136.4	2291	2224	7.534	2302.1	47.3
906	754	747	5.006	4.944	27.271												
907	703	697	5.189	5.131	27.260	34.498	3.45	0.0	33.7	18.1	2214.5	1151.0				2303.6	43.0
908	704	697	5.187	5.129	27.260												
909	552	547	6.036	5.987	27.182	34.532	3.91	0.0	33.6	14.7	2206.9	1104.3				2301.8	35.0
910	553	548	6.040	5.991	27.182												
911	402	399	8.505	8.462	27.018	34.764	2.57	0.0	32.0	10.3	2209.4	1113.7				2304.0	39.5
912	403	399	8.532	8.489	27.017												
913	232	231	12.845	12.813	26.631	35.258	2.45	0.0	24.1	5.8	2194.6	900.3				2324.5	44.9
914	233	231	12.841	12.809	26.634												
915	183	181	13.161	13.136	26.590	35.289	3.47	0.3	17.8	4.5	2151.7	667.9				2331.3	39.5
916	184	182	13.158	13.132	26.591												
917	124	123	14.730	14.711	26.427	35.511	3.35	0.0	16.2	3.9	2146.9	612.2				2344.4	74.2
918	124	123	14.710	14.691	26.429												
919	85	85	17.514	17.500	26.071	35.888	3.39	0.0	11.3	2.6	2138.5	527.2	2381	2174	7.813	2368.6	53.4
920	86	85	17.506	17.492	26.072												
921	43	43	24.430	24.421	24.405	36.168	4.84	0.0	0.0	0.7	2049.1	322.3	2374	2071	8.038	2385.4	64.5
922	43	43	24.428	24.419	24.418												
923	3	3	24.995	24.994	24.121		4.74	0.0	0.0	0.6	2032.4	307.6	2359	2052	8.021	2376.6	79.5
924	3	3	25.023	25.022	24.107												

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 11
Cast 10

Operation #0911980054.0
Date 7/17/1991
Time (GMT) 854

Latitude -1.99
Longitude -25.00
Bottom Depth 4820

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1001	5006	4911	0.727	0.318	27.858	34.718	5.23	0.0	33.4		2257.1	*969.7*	2381	2266	7.661	2379.3	
1002	4396	4318	1.052	0.702	27.868	34.755	5.45	0.0	28.2		2245.7	*922.0*				2375.5	
1003	3844	3781	2.282	1.957	27.891	34.895	6.12	0.0	20.0	36.8	*2240.9*	*734.6*				2412.7	
1004	3396	3344	2.532	2.250	27.880	34.911	5.77	0.0	20.4	35.9	2180.4	*745.7*	2334	2183	7.749	2341.2	
1005	2797	2758	2.798	2.572	27.862	*34.313*	5.67	0.0	20.9	35.3	2181.5	755.3	2322	2192	7.690	2340.2	
1006	2095	2069	3.492	3.323	27.831	34.972	6.03	0.0	19.5	20.4	2164.0	726.7	2323	2175	7.750	2327.7	
1007	1798	1777	3.903	3.756	27.796	34.980	5.66	0.0	20.0	17.6	2164.5	740.1	2310	2180	7.695	2324.9	
1008	1596	1578	4.299	4.166	27.746	34.971	5.55	0.0	21.5	18.1	2173.1	779.5	2317	2175	7.736	2325.6	
1009	1397	1382	4.417	4.302	27.696	34.926	4.88	0.0	23.2	20.6	2181.6	831.6	2316	2198	7.657	2322.6	
1010	1198	1185	4.503	4.405	27.653	34.887	4.75	0.0	25.4	22.7	2190.4	887.4	2322	2201	7.687	2320.2	
1011	1096	1085	4.439	4.351	27.555												
1012	997	987	4.342	4.264	27.429	34.587	3.81	0.0	33.0	33.3	2216.7	1103.4	2305	2229	7.555	2312.8	
1013	850	841	4.542	4.475	27.352	34.517	3.87	0.0	33.8	32.5	2216.1	1144.8	2306	2219	7.598	2306.2	
1014	750	743	4.600	4.541	27.319	34.494	3.74	0.0	33.0	32.6	2214.4	1160.9	2303	2223	7.526	2302.1	
1015	600	595	5.410	5.360	27.227	34.492	3.57	0.0	33.7	27.8	2209.2	1133.5	2297	2222	7.579	2300.2	
1016	554	549	5.778	5.730	27.196	34.507	3.41	0.0	33.7	25.6	2210.3	1139.2	2292	2221	7.553	2298.3	
1017	502	497	6.632	6.586	27.133	34.566	3.44	0.0	32.6	22.5	2204.9	1110.7	2300	2213	7.608	2297.7	
1018	402	399	8.885	8.841	26.988	34.801	2.18	*0.6*	30.3	16.4	2218.9	1207.4	2295	2226	7.544	2302.8	
1019	303	301	10.967	10.930	26.813	35.031	2.45	0.0	29.3	12.4	2206.2	1047.5	2308	2208	7.628	2311.1	
1020	204	203	12.942	12.914	26.622	35.272	2.21	0.0	29.3	12.7	2191.9	885.1	2312	2202	7.643	2324.4	
1021	105	104	14.281	14.266	26.475	35.447	2.42	0.0	22.1	7.7	2180.1	796.4	2325	2186	7.721	2330.8	
1022	64	64	24.946	24.932	24.198	36.094	4.64	0.0	0.0	1.4	2040.3	319.0	2373	2065	8.048	2377.5	
1023	44	43	25.214	25.204	24.104	36.088	4.75	0.0	0.0	1.2	2035.3	322.1	2367	2063	8.018	2368.9	
1024	3	3	25.326	25.325	24.066	36.088	4.71	0.0	0.0	1.1	2034.5	*313.8*	2358	2052	8.020	2368.2	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912010096.0	Latitude	-4.00
Station	12	Date	7/20/1991	Longitude	-25.00
Cast	11	Time (GMT)	1146	Bottom Depth	5643

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1101	5245	5142	0.727	0.290	27.858	34.710	5.09	0.0	30.8	108.7	2259.0	983.0	2361	2288	7.557	2379.0	
1102	4743	4655	0.821	0.439	27.862	34.729	5.25	0.0	29.2	101.6	2252.7	960.7	2335	2257		2376.1	
1103	4247	4173	1.294	0.953	27.874	34.783	5.36	0.0	26.7	82.6	2234.7	878.6	2369	2248	7.686	2371.9	
1104	3796	3734	2.377	2.055	27.890												
1105	3496	3441	2.545	2.252	27.884	34.914		0.0	19.1	30.6	2175.2	729.8	2296	2183		2339.4	
1106	2974	2930	2.689	2.448	27.871	34.922	5.85	0.0	19.6	31.4	2182.0	742.2	2300	2202	7.688	2344.0	
1107	2487	2454	2.954	2.756	27.853	34.930	6.11	0.0	20.4	28.8	2180.0	742.7	2285	2176		2341.7	
1108	1999	1975	3.508	3.348	27.824	34.963	5.77	0.0	19.3	19.2	2169.8	728.3	2271	2171	7.695	2333.9	
1109	1497	1481	4.249	4.126	27.735	34.950	5.19	0.0	21.8	17.4	2179.2	794.3	2278	2174		2328.4	
1110	1200	1187	4.320	4.224	27.584	34.774	4.22	0.0	28.9	25.7	2207.2	950.5	2278	2218	7.580	2327.5	
1111	1097	1086	4.239	4.153	27.503	34.661	3.88	0.0	31.3	29.6	2217.9	1072.8	2276	2243		2319.0	
1112	1002	992	4.196	4.119	27.424	34.558	3.90	0.0	33.2	31.8	2221.4	1110.8	2266	2239	7.503	2316.9	
1113	898	889	4.329	4.259	27.367	34.506		0.0	34.2	31.2	2221.7	1142.4	2275	2225		2312.6	
1114	797	789	4.668	4.605	27.308	34.477	3.53	0.0	35.8	29.4	2224.0	1181.1	2261	2229	7.516	2309.8	
1115	700	694	5.149	5.091	27.257	34.485	3.43	0.0	35.6	26.7	2222.2	1210.6	2257	2220		2304.1	
1116	600	595	5.979	5.926	27.195	34.534	3.00	0.0	34.9	22.8	2223.4	1231.9	2253	2236	7.483	2304.5	
1117	502	498	7.430	7.381	27.101												
1118	401	397	9.637	9.591	26.917	34.863		0.0	26.8	12.4	2193.9	986.0	2271	2199		2297.6	
1119	302	299	11.446	11.408	26.763	35.076	2.89	0.0	23.2	9.3	2180.6	882.9	2273	2198	7.626	2311.6	
1120	203	201	12.834	12.806	26.633	35.262	2.13	0.0	23.9	8.6	2197.3	912.8				2325.1	
1121	125	124	14.363	14.345	26.462	35.448		0.0	20.5	6.7		807.5			7.626		
1122	84	84	21.594	21.577	25.257	36.210					2101.9	403.6	2361	2104	7.965	2390.4	
1123	45	45	26.088	26.078	23.700	35.911	4.86				2012.8	308.2	2321	2040	7.981	2350.7	
1124	3	3	26.169	26.168	23.672	35.912	*4.66*	0.4	3.3	1.5	2020.3	292.7				2375.2	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 13
Cast 12

Operation # 0912020109.0
Date 7/21/1991
Time (GMT) 353

Latitude -6.00
Longitude -25.00
Bottom Depth 5643

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1201	5559	5447	0.690	0.216	27.856	34.706	5.09			109.0	2257.0	1004.9	2363	2272	7.610	2373.8	
1202	4994	4899	0.771	0.362	27.859	34.719	5.14			106.2	2256.0	*978.3*	2367	2266	7.614	2374.6	
1203	4993	4898	0.770	0.361	27.860	*34.732*	5.15			103.1	2252.3	984.3				2379.0	
1204	4493	4413	0.986	0.627	27.867	34.748	5.40			93.4	2245.7	940.5	2366	2247	7.661	2372.0	
1205	3695	3635	2.441	2.129	27.888	34.913	5.91			33.4	2175.4	731.5	2326	2191	7.697	2339.2	
1206	2996	2953	2.681	2.438	27.866	34.909				35.2	2185.7	760.3	2336	2187	7.739	2343.6	
1207	2617	2581	2.811	2.603	27.852	34.909	5.57			34.9	2184.0	772.6	2331	2204	7.694	2338.6	
1208	1996	1971	3.464	3.305	27.823	34.951	6.11			21.8	2169.3	744.5	2304	2166	7.683	2329.1	
1209	1886	1863	3.630	3.479	27.812	34.957	5.70			17.5	2166.0	742.4	2289	2173	7.640	2326.0	
1210	1797	1776	3.797	3.652	27.800	34.966	6.13			17.5	2168.6	747.1	2315	2180	7.726	2327.7	
1211	1700	1680	3.959	3.821	27.787	34.985	5.57			16.2	2165.9	748.6	2303	2175	7.690	2324.3	
1212	1498	1481	4.264	4.141	27.731	*34.939*	5.55			17.6	2178.4	802.6	2315	2184	7.713	2325.6	
1213	1299	1285	4.402	4.296	27.667	*34.877*				18.4	2189.1	*870.9*	2312	2202	7.649	2322.7	
1214	1100	1088	4.274	4.187	27.564	*34.734*	4.12			26.6	2211.8	1001.7	2301	2209	7.567	2323.7	
1215	898	889	4.096	4.028	27.389	*34.491*				33.4	2216.8	1119.6	2276	2223	7.492	2310.4	
1216	800	793	4.580	4.517	27.306	*34.453*				29.6	2221.4	1165.1	2302	2219	7.576	2309.1	
1217	700	694	5.213	5.155	27.250	*34.469*				25.3	2218.5	1213.3	2291	2218	7.544	2299.7	
1218	602	596	6.078	6.025	27.187	*34.528*				22.8		1238.5	2299	2223	7.546		
1219	403	399	8.495	8.452	27.021	34.773	2.79			15.9	2227.8	1281.8	2294	2236	7.508	2302.3	
1220	205	204	11.548	11.522	26.774	*35.107*				9.7	2199.6	973.9	2311	2202	7.644	2316.1	49.8
1221	125	124	19.454	19.431	25.747	*36.082*				2.9	2134.3	496.8	2362	2150	7.847	2379.3	69.5
1222	85	84	26.073	26.054	24.117	*36.504*						314.8	2397	2051	8.089		102.9
1223	47	46	26.248	26.238	23.899	*36.219*	4.64				2031.5	293.3	2369	2052	8.035	2390.3	95.8
1224	3	3	26.254	26.253	23.891	*36.222*	4.65				2033.8	291.8	2369	2037	8.055	2394.8	78.7

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912020122.0	Latitude	-8.00
Station	15	Date	7/21/1991	Longitude	-25.00
Cast	13	Time (GMT)	1931	Bottom Depth	5653

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1301	5780	5660	0.690	0.188	27.855	34.701	*5.15*	0.0	32.7	115.5	2257.7	999.7	2387	2260	7.647	2374.7	
1302	3997	3929	1.933	1.601	27.882	34.853	5.61	0.0	24.8	59.4	2204.7	800.0	2355	2236	7.649	2354.8	
1303	2996	2953	2.685	2.441	27.865	34.913		0.0	21.7	36.0	2185.8	758.3	2336	2182	7.741	2344.4	
1304	1994	1969	3.331	3.174	27.823	34.943	5.60	0.0	21.6	24.4	2173.7	753.6	2323	2188	7.697	2331.8	
1305	1596	1578	3.905	3.777	27.761	34.939	5.51	0.0	21.8	21.4	2176.0	799.0	2318	2168	7.721	2323.6	
1306	1395	1380	4.117	4.005	27.701	34.893	4.88	0.0	25.6	21.1	2188.3	852.6	2310	2196	7.643	2325.6	
1307	1197	1185	4.102	4.008	27.581	34.743		0.0	31.2	29.2	2207.5	1007.7	2317	2217	7.611	2317.9	
1308	997	987	4.172	4.095	27.429	34.567	3.87	0.0	38.0	32.5	2223.3	1148.7	2302	2234	7.526	2313.7	
1309	800	792	4.802	4.738	27.291	*34.493*	3.37	0.0	39.0	28.7	2223.0	1207.0				2305.4	
1310	753	746	5.046	4.984	27.265	34.482	*4.57*	0.0	39.1	27.2	2222.2	1214.0	2283	2230	7.490	2303.7	
1311	703	696	5.468	5.408	27.232	34.510		0.0	38.8	24.4	2223.5	1240.3	2291	2217	7.523	2301.8	
1312	600	595	6.253	6.199	27.174	34.552	2.86	0.0	39.9	21.2	2220.8	*1247.1*	2303	2223	7.545	2298.3	
1313	503	498	7.260	7.211	27.111	34.647		0.0	39.9	18.3	2222.3	1328.4	2287	2239	7.473	2290.6	
1314	401	397	8.331	8.289	27.029	34.743	2.37	0.0	37.3	14.8	2222.3	1237.2	2297	2223	7.546	2301.7	
1315	353	350	8.944	8.906	26.985	34.817		0.0	35.2	13.4	2217.8	1211.7	2295	2230	7.523	2300.1	
1316	302	299	9.609	9.575	26.920	34.866	2.82	0.0	30.5	11.4	2196.0	1009.8	2305	2201	7.629	2305.3	
1317	254	252	10.147	10.117	26.881	34.935				9.5	2194.5	958.9	2299	2207	7.596	2312.5	
1318	205	203	11.478	11.452	26.776	35.111	2.74	0.0	26.6	7.0	2187.9	875.0	2316	2190	7.677	2321.4	
1319	153	152	14.490	14.467	26.474	35.499		0.0	20.3	3.3	2172.2	723.9	2326	2186	7.703	2340.0	
1320	104	104	22.880	22.859	25.268	*36.732*	4.78	0.0	0.0	0.0	2084.6	346.6	2410	2098	8.003	2412.7	
1321	78	77	26.163	26.146	24.070	36.432		0.0	0.0	0.0	2022.2	276.0				2397.6	
1322	46	46	26.271	26.261	23.974	36.350		0.0	0.0	0.0	2017.4	271.8	2403	2037	8.070	2395.5	
1323	29	29	26.266	26.259	23.973	36.350	4.64	0.0	0.0	0.0	2015.9		2396	2051	8.016		
1324	3	3	26.253	26.252	23.975	*36.366*		0.0	0.0	0.0	2016.1	269.8	2384	2027	8.099	2395.8	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 16
Cast 14

Operation # 0912030131.0
Date 7/22/1991
Time (GMT) 417

Latitude -9.00
Longitude -25.00
Bottom Depth 5638

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1401	1014	1004	4.094	4.016	27.445	*34.587*	3.79	0.0	33.3	32.2	2217.8	1110.5	2299	2226	7.593	2313.0	
1402	1014	1004	4.094	4.016	27.445												
1403	871	862	4.421	4.353	27.341	34.488	*4.53*	0.0	36.2	31.0	2219.7	*1204.0*	2296	2227	7.542	2302.2	
1404	871	863	4.421	4.353	27.342												
1405	754	747	4.963	4.902	27.267	34.473	3.33	0.0	35.3	26.9	2218.4	*1190.2*	2292	2226	7.564	2302.5	
1406	754	747	4.967	4.906	27.268												
1407	630	624	5.715	5.661	27.211	34.514	*3.90*	0.0	37.1	23.5	2222.9	1234.2	2295	2232	7.519	2302.1	
1408	628	623	5.717	5.663	27.211												
1409	502	497	6.788	6.741	27.138	34.599	2.52	0.0		20.1	2224.8	1263.9	2334	2278	7.497	2300.7	
1410	503	499	6.803	6.756	27.136												
1411	354	351	8.572	8.534	27.013	34.772		0.0	33.0	15.0	2216.9	1188.1	2290	2235	7.546	2302.1	
1412	352	349	8.567	8.530	27.015												
1413	255	253	10.486	10.455	26.868	34.997	2.61	0.0	28.6	11.2	2203.2	1026.2	2302	2225	7.554	2311.1	
1414	253	251	10.513	10.483	26.869												
1415	184	182	13.627	13.601	26.565	34.378		0.0	22.6	5.6	2182.5	790.4	2323	2197	7.668	2334.6	
1416	183	182	13.648	13.622	26.564												
1417	124	123	20.859	20.835	25.623	36.430		0.5	2.0	0.0	2105.1	401.7	2389	2129	7.927	2397.0	
1418	123	122	20.915	20.891	25.619												
1419	102	101	23.156	23.135	25.198	36.716		0.0	0.0	0.0	2078.6	323.2	2404	2101	8.030	2425.1	
1420	100	100	23.260	23.239	25.177												
1421	44	43	25.840	25.830	24.249	36.535	4.66	0.0	0.0	0.0	2032.0	281.1	2385	2057	8.085	2405.2	
1422	44	44	25.836	25.826	24.250												
1423	2	2	25.836	25.835	24.247	36.537	4.67	0.0	0.0	0.0	2031.8	279.9	2383	2059	8.038	2406.4	
1424	3	3	25.833	25.832	24.249												

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912030141.0	Latitude	-10.99
Station	18	Date	7/22/1991	Longitude	-25.00
Cast	15	Time (GMT)	1752	Bottom Depth	5642

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1501	5654	5538	0.727	0.239	27.857	*34.719*	*5.32*	0.0	31.7	115.3	2259.7	997.3	2367	2252	7.655	2381.3	
1502	4994	4899	0.769	0.360	27.861	34.724	5.17	0.0	32.6	114.0	2252.2	966.2				2374.2	
1503	4480	4400	1.010	0.652	27.867	34.756		0.0		104.5	2241.6	930.0	2359	2260	7.614	2369.4	
1504	3993	3926	1.898	1.568	27.879	34.845	5.83	0.0	25.9	63.6	2206.7	810.1	2345	2210	7.708	2355.3	
1505	3497	3442	2.544	2.251	27.880	34.910		0.0	22.1	35.2	2179.7	742.1	2327	2194	7.697	2341.3	
1506	2993	2950	2.737	2.493	27.868	34.928	5.74	0.0	22.5	31.7	2178.5	743.0	2329	2179	7.743	2339.7	
1507	2496	2462	2.998	2.799	27.853	34.938		0.0	21.9	27.1	2175.2	736.4	2319	2182	7.702	2337.8	
1508	1996	1972	3.439	3.280	27.828	34.968	*6.04*	0.0	21.1	20.2	2166.4	732.0	2322	2169	7.754	2328.9	
1509	1600	1581	3.922	3.794	27.768	34.953					2173.3	763.7	2316	2191	7.681	2328.8	
1510	1357	1342	4.204	4.095	27.657	34.851		0.0	28.4	23.9	2191.2	893.2	2315	2187	7.677	2320.6	
1511	999	989	3.932	3.857	27.426	34.533	3.96	0.0	34.2	35.1	2221.1	1069.1	2305	2230	7.653	2322.6	
1512	802	794	4.523	4.460	27.301	34.451	3.91	0.0		30.3	2217.6	1128.7	2302	2220	7.574	2309.8	
1513	601	596	5.742	5.690	27.195	34.500		0.0	34.7	22.7	2210.9	1136.2	2296	2221	7.536	2301.7	
1514	502	497	6.759	6.712	27.129	34.584	3.01	0.0	35.0	19.0	2213.9	1153.2	2296	2223	7.559	2302.9	
1515	403	400	8.006	7.965	27.047	*34.742*		0.0	32.1	15.1	2206.2	1103.5	2291	2221	7.541	2301.8	
1516	301	299	10.380	10.344	26.852	34.949		0.0	27.8	10.3	2192.7	953.3	2305	2194	7.646	2311.4	
1517	252	250	12.335	12.301	26.658	*35.232*	3.18	0.0	21.1	5.9	2164.7	755.6	2312	2181	7.691	2322.0	
1518	202	200	15.102	15.071	26.354	35.521		0.4	14.7	2.8	2137.0	*573.0*	2328	2143	7.812	2346.8	66.5
1519	153	152	20.306	20.277	25.706	*36.348*	4.29	0.4	3.4	0.0	2109.5	409.6	2378	2130	7.908	2396.7	
1520	103	102	25.451	25.428	24.604	36.841		0.0	0.0	0.0	2051.4	331.8	2414	2056	8.091	2384.6	85.1
1521	76	75	25.464	25.447	24.596	36.840		0.0	0.0	0.0	2053.7	283.6				2432.5	91.9
1522	44	44	25.459	25.449	24.595	36.840	4.78	0.0	0.0	0.0	2051.0	283.6	2412	2060	8.089	2429.1	97.5
1523	29	29	25.452	25.446	24.596	36.841		0.0	0.0	0.0	2052.8	282.4	2409	2073	8.047	2432.7	86.6
1524	3	3	25.443	25.442	24.597	36.838	4.70	0.0	0.0	0.0	2064.1	284.4	2415	2058	8.098	2444.9	89.1

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 19
Cast 16

Operation # 0912040148.0
Date 7/23/1991
Time (GMT) 651

Latitude -13.00
Longitude -25.00
Bottom Depth 4648

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1601	1020	1010	3.858	3.782	27.446		4.01	0.0	32.9	36.0	2217.6	1069.2	2307	2222	7.572	2317.3	
1602	1020	1010	3.858	3.782	27.446						2216.3	1072.1				2316.9	
1603	901	892	4.046	3.978	27.377	34.486	3.88	0.0	34.7	36.1	2218.9	1120.1	2297	2231	7.521	2312.7	
1604	800	792	4.314	4.253	27.319	34.447	4.12	0.0	35.7	32.1	2213.9	1119.7	2282	2221	7.512	2307.0	
1605	703	696	4.575	4.520	27.277	*34.445*	3.90	0.0	33.9	29.5	2210.1	1101.1	2277	2215	7.498	2306.7	
1606	601	596	5.233	5.184	27.214	*34.481*		0.0	33.3	25.2	2202.8	1085.2	2312	2208	7.607	2299.8	
1607	545	540	5.545	5.499	27.176	34.450		0.0	33.1	21.9	2189.2	1019.4	2302	2191	7.609	2297.2	
1608	502	498	6.088	6.044	27.139	34.486	4.07	0.0	29.1	19.0	2194.5	1018.4	2287	2204	7.618	2301.0	
1609	451	447	7.174	7.131	27.083	34.596		0.0	29.7	17.7	2193.3	998.1	2293	2211	7.572	2303.4	
1610	401	398	8.255	8.213	27.010	34.705		0.0	28.8	14.4	2196.0	*1003.7*	2294	2208	7.626	2306.8	
1611	350	347	9.423	9.384	26.920	34.827		0.0	27.7	12.4	2195.4	995.5	2296	2207	7.590	2306.9	
1612	302	300	11.002	10.965	26.782	35.006			24.1	9.4	2183.1	911.7	2304	2193	7.676	2308.6	
1613	251	249	12.917	12.882	26.581	35.212		0.0	17.5	5.3	2154.8	701.8	2314	2165	7.724	2324.9	
1614	202	200	15.757	15.725	26.265	*35.604*		0.0	8.9	2.0	2117.2	511.5	2338	2137	7.883	2348.8	
1615	152	151	20.495	20.466	25.682	36.375		0.3	0.7	0.0	2097.0	384.7	2385	2114	7.961	2398.1	
1616	112	111	23.826	23.802	25.141	36.900		0.0	0.0	0.0	2075.9	310.1	2415	2095	8.071	2434.4	
1617	63	62	24.957	24.943	24.882			0.0	0.0	0.0	2062.4	*286.1*	2426	2086	8.058	2440.4	
1618	64	63	24.958	24.944	24.881	37.011	4.69					286.5					
1619	3	3	24.936	24.935	24.884	37.012	4.81	0.0	0.0	0.0	2057.3	285.0	2427	2081	8.062	2436.9	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912040159.0	Latitude	-15.00
Station	21	Date	7/23/1991	Longitude	-25.00
Cast	17	Time (GMT)	2031	Bottom Depth	5648

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1701	5450	5341	0.718	0.256	27.858	34.733	5.13	0.0	31.6	120.9	2254.4	985.3	2365	2283	7.611	2373.2	
1702	4743	4656	0.876	0.492	27.864	34.739		0.0	31.1	105.1	2248.7	939.8	2360	2234	7.583	2375.3	
1703	3994	3927	1.765	1.438	27.877	34.837	5.68	0.0	25.9	68.3	2210.6	830.5				2355.1	
1704	3495	3441	2.451	2.160	27.871	34.894		0.0	21.9	46.0	2190.8	780.9				2344.3	
1705	2995	2951	2.663	2.420	27.859	34.904	5.54	0.0	21.6	39.7	2187.9	767.3	2335	2207	7.689	2344.3	
1706	2495	2461	2.801	2.605	27.847	34.909		0.0	21.9	36.8	2188.8	770.7	2329	2201	7.683	2344.6	
1707	1994	1970	3.192	3.037	27.823	34.926	5.74	0.0	20.9	28.4	2176.3	770.9	2327	2202	7.734	2330.4	
1708	1587	1569	3.890	3.763	27.753	34.929		0.0	22.2	21.4	2178.9	804.1	2313	2194	7.669	2325.6	
1709	1237	1224	4.001	3.905	27.588	34.738			29.3	30.5	2204.3	948.6	2335	2229	7.669	2324.5	
1710	998	989	3.796	3.722	27.431	34.533	4.14	0.0	33.6	37.1	2216.3	1074.5	2304	2224	7.561	2316.5	
1711	800	793	4.180	4.120	27.317	34.427	4.20	0.0	33.3	35.0	2205.4	1073.0	2326	2231	7.635	2304.5	
1712	620	614	5.523	5.471	27.184	34.457		0.0	32.7	22.4	2192.9	1026.4	2287	2204	7.568	2297.9	
1713	500	495	7.150	7.102	27.090	34.605	3.77	0.0	30.8	17.5	2195.2	1031.4	2292	2209	7.619	2300.1	
1714	401	397	9.111	9.067	26.951			0.0		16.2	2201.6	1042.8	2297	2213	7.562	2306.0	
1715	350	347	10.194	10.153	26.846						2183.2	914.2	2304	2182	7.652	2307.8	
1716	302	299	11.818	11.779	26.692	35.078	3.06	0.0	24.6	10.1	2171.6	818.3	2312	2182	7.694	2314.9	
1717	251	248	13.672	13.636	26.500			0.0	21.3	7.3	2146.4	654.6	2318	2163	7.794	2329.3	
1718	200	199	16.338	16.306	26.193	35.671	4.17	0.0	15.7	4.7	2111.5	487.3	2351	2130	7.867	2354.7	
1719	143	142	20.398	20.371	25.681			0.0	7.6	1.8	2093.4	375.5	2385	2125	7.977	2399.9	
1720	103	102	23.141	23.120	25.316	36.870	4.89	0.3	1.0	0.0	2082.9	319.6	2416	2106	8.002	2434.5	
1721	78	77	24.219	24.202	25.162			0.0	0.0	0.0	2075.4	298.9	2430	2094	8.086	2446.1	
1722	44	44	24.372	24.363	25.112	37.090	4.76	0.0	0.0	0.0	2070.8	292.5	2433	2097	8.042	2446.7	
1723	30	30	24.377	24.371	25.108	37.082		0.0	0.0	0.0	2070.1	292.4	2423	2098	8.012	2446.0	
1724	2	2	24.370	24.370	25.109	37.088	4.95	0.0	0.0	0.0	2070.9	291.5	2424	2095	8.020	2447.9	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 22
Cast 18

Operation # 0912050169.0
Date 7/24/1991
Time (GMT) 1017

Latitude -17.00
Longitude -25.00
Bottom Depth 5343

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1801	5229	5127	0.719	0.284	27.858	34.711	5.16	0.0	31.0	110.9	2255.4		2357	2260	7.594		
1802	4794	4705	0.830	0.442	27.862	34.727	5.21	0.0	30.6	106.0	2248.8		2359	2259	7.608		
1803	4395	4317	1.177	0.823	27.869	34.766		0.0	28.6	92.1	2231.7	903.5	2353	2244	7.656	2363.4	
1804	3895	3830	1.935	1.614	27.876	34.841		0.0	23.6	60.7	2205.1	812.8	2329	2210	7.661	2352.9	
1805	3495	3440	2.489	2.197	27.871	34.892	5.66	0.0	21.4	41.2	2188.6	767.0	2319	2215	7.598	2345.2	
1806	2995	2951	2.673	2.430	27.859	34.909	5.67	0.0	22.9	38.3	2188.2	765.5	2312	2197	7.621	2345.1	
1807	2494	2461	2.803	2.607	27.845	34.902		0.0	21.4	37.8	2188.0	766.5	2337	2186	7.725	2344.7	
1808	1995	1971	3.078	2.925	27.823	34.910	5.73	0.0	22.2	29.5	2179.0	765.4	2316	2189	7.684	2334.8	
1809	1645	1626	3.457	3.330	27.764	34.887		0.0	23.5	27.3	2187.2	803.6	2316	2190	7.702	2334.9	
1810	1397	1382	3.773	3.665	27.681	34.827		0.0	25.9	27.6	2195.0	880.4	2313	2203	7.638	2327.2	
1811	1197	1185	3.841	3.750	27.581	34.708	5.22	0.0	29.7	32.5	*2210.0*	963.8	2308	2207	7.634	2328.0	
1812	998	988	3.720	3.647	27.445	34.522	4.19	0.0	32.9	39.0	2215.0	1054.8	2307	2223	7.570	2318.0	
1813	898	890	3.804	3.738	27.398	34.474					2216.3	1065.8	2306	2223	7.595	2317.6	
1814	799	792	4.141	4.081	27.328	34.430	4.11	0.0	33.5	*37.8*	2211.0	1069.2	2298	2221	7.555	2311.2	
1815	699	693	4.636	4.581	27.267												
1816	600	595	5.650	5.599	27.185	34.469		0.0	34.7	33.7	2198.0	1046.9	2298	2203	7.603	2300.4	
1817	480	476	8.108	8.058	27.001	34.660		0.0	33.5	22.7	2186.0	936.5	2294	2196	7.611	2306.1	
1818	399	396	10.036	9.989	26.833	34.843	3.56	0.0	27.9	14.4	2165.0	820.7	2295	2172	7.703	2306.0	
1819	301	298	12.953	12.911	26.527	35.145		0.0	26.8	8.9	2123.5	578.3	2307	2136	7.786	2327.4	
1820	201	200	17.945	17.910	25.988	35.903	4.55	0.0	13.1	3.2	2095.3	435.9	2355	2111	7.945	2361.8	
1821	141	140	23.683	23.653	25.377	37.151		0.0	3.6	0.0	2088.7	306.2	2429	2102	8.026	2456.3	
1822	102	102	23.733	23.711	25.374	37.166		0.0	0.0	0.0	2085.9	305.6	2434	2112	8.053	2453.6	
1823	55	54	23.726	23.714	25.372	37.167	*5.83*	0.0	0.0	0.0	2087.8	305.8	2431	2105	8.027	2454.3	
1824	3	2	23.751	23.750	25.362	37.169	4.81	0.0	0.0	0.0	2087.0	306.0	2454	2111	8.006	2454.6	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 23
Cast 19

Operation # 0912060180.0
Date 7/25/1991
Time (GMT) 145

Latitude -19.00
Longitude -25.00
Bottom Depth 5652

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
1901	5776	5656	0.547	0.051	27.852	34.692	5.09	0.0	33.4	119.6	2261.7	1020.0	2370	2263	7.626	2375.6	38.3
1902	4743	4655	0.962	0.576	27.864	34.740		0.0	30.0	100.9	2244.1	941.0	2360	2259	7.609	2370.1	29.2
1903	3995	3927	1.856	1.527	27.877	34.836	5.54	0.0	24.4	61.5	2209.3	817.5	2348	2217	7.713	2372.4	38.6
1904	3494	3439	2.473	2.182	27.875	34.897	5.74	0.0	21.2	39.1	2184.1	759.1	2331	2199	7.701	2342.1	
1905	2995	2951	2.679	2.436	27.862	34.905	5.62	0.0	21.6	36.9	2186.3	755.6	2306	2184	7.660	2345.4	32.4
1906	2495	2461	2.872	2.675	27.849	34.917	5.64	0.0	22.0	32.9	2179.1	*751.6*	2327	2196	7.727	2338.3	
1907	1993	1969	3.233	3.078	27.820	34.928	5.59	0.0	22.7	29.5	2176.6	751.9	2305	2191	7.634	2335.4	27.9
1908	1498	1481	3.668	3.552	27.715	34.852	4.94	0.0	24.9	28.3	2190.4	841.2	2317	2298	7.688	2330.2	38.7
1909	997	987	3.738	3.665	27.431	34.512	4.12	0.0	33.4	38.6	2216.5	1057.5	2312	2232	7.566	2319.3	38.7
1910	799	792	4.265	4.204	27.308	34.424	4.05	0.0	33.4	33.0	2207.3	1065.2	2306	2225	7.597	2307.7	41.4
1911	700	693	4.852	4.796	27.247	34.430	3.92	0.0	33.5	27.6	2208.3	*1067.3*	2296	2220	7.559	2308.5	29.5
1912	600	594	5.803	5.751	27.169	34.474	3.80	0.0	31.7	22.0	2197.6	1032.3	2284	2202	7.572	2302.2	55.3
1913	501	496	7.739	7.689	27.022	34.621	3.61	0.0	29.0	14.4	2183.3	925.4	2291	2197	7.607	2304.9	42.0
1914	401	398	10.197	10.149	26.811	34.851	*4.23*	0.0	23.1	7.7	2155.5	746.3	2297	2149	7.733	2312.6	48.1
1915	349	346	11.589	11.544	26.672	34.989	4.04	0.0	17.4	4.7	2142.0	661.8	2294	2152	7.708	2320.8	42.0
1916	302	300	13.330	13.288	26.473	*35.189*	4.25	0.0	11.7	2.3	2114.5	548.1	2310	2122	7.808	2328.5	73.8
1917	251	249	15.144	15.106	26.287	35.433	4.51	0.0	7.2	1.1	2101.9	481.1	2309	2110	7.817	2343.9	48.7
1918	202	200	17.361	17.327	26.049	35.792	4.68	0.0	3.6	0.0	2085.3	412.9	2352	2089	7.956	2362.5	65.9
1919	153	152	20.901	20.872	25.655	36.479	4.86	0.0	0.0	0.0	2087.3	355.0	2380	2111	7.917	2408.3	47.6
1920	102	101	23.106	23.085	25.422	*35.014*	4.78	0.0	0.0	0.0	2087.4	314.3	2422	2097	8.028	2446.0	75.7
1921	75	75	23.121	23.105	25.423	36.997	4.88	0.0	0.0	0.0	2083.7	313.2	2453	2112	8.024	2442.5	76.4
1922	44	43	23.131	23.122	25.417	36.997	4.83	0.0	0.0	0.0	2085.5	315.9	2428	2155	8.024	2442.2	86.2
1923	28	28	23.124	23.118	25.416	36.997	4.85	0.0	0.0	0.0	2081.5	313.5	2422	2108	7.990	2439.3	114.0
1924	3	2	23.111	23.110	25.421	37.005	4.87	0.0	0.0	0.0	2084.4	311.4	2424	2104	8.009	2419.7	86.1

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 24
Cast 20

Operation # 0912060188.0
Date 7/25/1991
Time (GMT) 1001

Latitude -20.00
Longitude -25.00
Bottom Depth 5648

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2001	1003	993	3.540	3.468	27.443	34.507	4.31	0.0	32.5	42.6	2215.4	*1028.0*	2306	2228	7.611	2322.5	
2002	901	892	3.783	3.717	27.369		4.32										
2003	901	893	3.783	3.717	27.368	34.438	4.29	0.0	32.2	38.4	2211.4	*1037.8*	2304	2220	7.573	2318.3	
2004	803	795	4.307	4.246	27.288												
2005	802	795	4.311	4.250	27.286	34.403	4.26	0.0	30.7	32.0	2203.7	1034.7	2297	2213	7.579	2308.4	
2006	702	695	5.133	5.075	27.206												
2007	702	696	5.122	5.064	27.207	34.418	4.19	0.0	30.6	24.8	2195.6	1004.9	2292	2210	7.616	2304.2	
2008	601	596	6.702	6.646	27.095												
2009	602	596	6.678	6.622	27.096	34.525	3.89	0.0	27.5	17.9	2186.4	957.8	2292	2198	7.607	2302.3	
2010	502	497	9.035	8.980	26.915												
2011	501	497	9.036	8.981	26.914	34.735	3.78	0.0	23.1	11.0	2167.5	838.0	2298	2182	7.697	2304.8	
2012	402	398	11.307	11.256	26.706		*3.79*										
2013	401	397	11.327	11.276	26.702	34.965	4.00	0.0	16.9	6.0	2142.3	677.0	2301	2154	7.734	2316.5	
2014	301	298	13.434	13.391	26.475												
2015	302	299	13.395	13.352	26.480	35.204	4.34	0.0	10.6	3.0	2116.9	544.6	2318	2135	7.853	2332.8	
2016	200	199	17.699	17.665	26.019												
2017	200	199	17.669	17.635	26.020	*35.868*	4.74	0.0	2.7	0.0	2086.6	414.2	2356	2103	7.944	2363.7	
2018	138	137	20.729	20.703	25.647												
2019	138	136	20.732	20.706	25.646	36.408	4.94	0.0		0.0	2079.2	348.6	2387	2102	8.022	2402.8	
2020	73	72	22.845	22.830	25.457												
2021	73	72	22.845	22.830	25.455	36.934	4.91	0.0		0.0	2082.9	319.4	2417	2105	8.016	2435.3	
2022	3	3	22.836	22.835	25.453												
2023	3	3	22.830	22.829	25.454	36.932	4.87	0.0		0.0	2084.1	315.7	2423	2114	8.045	2440.2	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 26
Cast 21

Operation # 0912060199.0
Date 7/25/1991
Time (GMT) 2253

Latitude -22.00
Longitude -25.00
Bottom Depth 5672

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2101	5220	5118	0.683	0.250	27.857												
2102	4495	4415	1.177	0.812	27.868	34.764	5.30	0.0			2236.4	896.9	2354	2247	7.628	2367.9	
2103	4495	4414	1.181	0.816	27.869	34.764	5.33	0.0	28.7	93.8	2234.8	*893.9*				2368.5	36.1
2104	3746	3685	2.068	1.760	27.880	34.862	5.63	0.0	22.3	58.4	2200.4	782.8	2339	2211	7.687	2354.6	
2105	2995	2951	2.698	2.454	27.870	34.927	5.77	0.0	21.7	36.0	2177.6	742.3	2325	2187	7.704	2360.5	34.2
2106	2493	2460	2.942	2.744	27.854	34.931	5.73	0.0	20.6	29.6	2178.9	741.0	2318	2190	7.678	2340.8	
2107	1995	1971	3.209	3.054	27.828	34.933	5.66	0.0	20.4	26.5	2173.1	*784.5*	2321	2175	7.734	2323.7	40.8
2108	1496	1480	3.255	3.144	27.695	34.776	4.77	0.0	26.9	41.7	2203.1	907.6				2330.8	
2109	1000	990	3.613	3.540	27.404	34.460	4.23	0.0	32.8	42.1	2215.9	1079.4	2295	2210	7.620	2315.1	35.9
2110	800	793	4.539	4.476	27.252	34.392	4.26	0.0	32.5	29.4	2199.8	1034.4	2308	2229	7.567	2304.1	
2111	699	693	5.855	5.794	27.136	34.438	4.27	0.0	30.1	20.5	2183.9	955.9	2280	2198	7.592	2299.5	37.7
2112	601	595	7.310	7.251	27.030	34.549	4.20	0.0	26.9	15.1	2172.0	881.5	2281	2183	7.612	2300.4	
2113	501	497	9.425	9.368	26.860	34.744	4.38	0.0	20.6	9.1	2146.4	724.1	2294	2160	7.736	2307.4	39.1
2114	401	397	11.985	11.932	26.627	35.030	4.46	0.0	14.8	4.6	2113.4	599.1	2304	2133	7.788	2307.9	47.4
2115	351	348	13.258	13.209	26.490	35.178	4.67	0.2	10.3	3.1	2105.7	522.4	2315	2119	7.862	2328.6	43.8
2116	301	298	14.673	14.628	26.333	35.352	*5.19*	0.0	6.5	1.9	2093.2	471.4	2318	2101	7.872	2337.9	46.1
2117	202	200	18.191	18.156	25.969	35.954	4.67	0.0	1.8	0.0	2088.1	*391.2*	2353	2105	7.914	2384.3	59.5
2118	166	164	20.049	20.018	25.768	36.324	4.82	0.2	0.0	0.0	2085.3	365.3	2381	2102	7.976	2397.2	52.4
2119	153	152	22.740	22.709	25.490	*36.900*	4.87	0.0	0.0	0.0	2085.4	317.7				2439.9	74.9
2120	105	104	22.896	22.875	25.475	36.978	4.89	0.0	0.0	0.0	2082.1	310.6	2423	2099	8.018	2442.7	70.4
2121	79	79	22.896	22.880	25.475	36.980	4.88	0.0	0.0	0.0	2084.0	310.5	2431	2099	8.067	2445.2	76.5
2122	44	44	22.885	22.876	25.476	36.980	4.88	0.0	0.0	0.0	*2075.1*	310.2	2424	2120	7.959	2434.2	79.8
2123	28	28	22.881	22.875	25.476	36.982	4.88										76.9
2124	2	2	22.922	22.922	25.465	36.983	4.82	0.0	0.0	0.0	2086.4	310.4	2428	2098	8.037	2448.3	74.0

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 27
Cast 22

Operation # 0912070207.0
Date 7/26/1991
Time (GMT) 1048

Latitude -24.00
Longitude -25.00
Bottom Depth 5304

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2201	998	989	3.769	3.695	27.377	34.445	4.25	0.0	32.4	36.1	2211.3	1049.2	2299	2230	7.561	2314.6	
2202	900	892	4.121	4.053	27.290	34.382	*4.48*						2289	2217	7.540		
2203	900	891	4.124	4.056	27.290	34.382	4.40	0.0	33.2	31.2	2202.7	1016.2				2309.7	
2204	900	891	4.124	4.056	27.290	34.382											
2205	803	795	4.754	4.690	27.210	34.369	4.52	0.0	31.9	25.5	2187.1	964.1	2284	2198	7.572	2301.4	
2206						34.371											
2207	703	697	5.787	5.726	27.133	34.424	4.47	0.0	29.8	17.2	2180.2	926.1	2276	2200	7.517	2300.6	
2208						34.423											
2209	602	596	7.606	7.546	27.006	34.582	4.20	0.0	26.6	11.9	2166.5	845.8	2285	2182	7.650	2301.4	
2210						34.580											
2211	501	496	9.437	9.380	26.859	34.746	4.34	0.0	20.3	6.9	2147.7	733.3	2278	2162	7.632	2306.6	
2212						34.747											
2213	402	398	11.811	11.759	26.646	35.011	4.55	0.0	8.5	0.0	2119.1	584.4	2298	2136	7.751	2319.5	
2214	401	397	11.985	11.932	26.627	35.011											
2215	301	299	14.004	13.960	26.406	*35.285*	4.67	0.0	2.3	0.0	2096.8	499.1	2316	2111	7.872	2328.6	
2216	303	300	13.976	13.932	26.403												
2217	201	199	16.891	16.858	26.099	35.721	4.86	0.0	0.0	0.0	2080.1	404.6	2335	2092	7.914	2360.8	
2218	201	199	16.896	16.863	26.099	35.716											
2219	132	131	21.926	21.900	25.548	36.706	4.97	0.0	0.0	0.0	2075.1	316.3				2426.8	
2220	105	104	22.896	22.875	25.475	36.978											
2221	62	62	21.906	21.894	25.546	36.704	5.00	0.0	0.0	0.0	2075.0	315.2	2404	2107	8.037	2427.6	
2222	63	63	21.905	21.892	25.548	36.704											
2223	2	2	21.945	21.945	25.533	36.709	5.11	0.0	0.0	0.0	2072.3	315.8	2423	2101	7.999	2423.7	
2224	2	2	21.967	21.967	25.527	36.707											

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912070216.0	Latitude	-25.99
Station	28	Date	7/26/1991	Longitude	-24.99
Cast	23	Time (GMT)	2316	Bottom Depth	4979

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2301	4960	4866	0.998	0.585	27.865	34.741	5.11	0.0	29.9	99.8	2244.6	933.6	2366	2241	7.658	2372.4	
2302	3992	3925	1.617	1.295	27.877	34.812	5.37	0.0	26.5	70.5	2216.4	849.9	2331	2221	7.645	2357.4	49.3
2303	3491	3436	2.340	2.053	27.879	34.888	5.71	0.0	22.6	41.3	2187.3	763.1	2336	2200	7.704	2344.6	
2304	2994	2950	2.688	2.445	27.872	34.921	5.77	0.0	21.7	31.7	2175.4	743.9	2315	2206	7.649	2336.1	67.7
2305	2492	2458	2.895	2.698	27.857	34.929	5.78	0.0	21.7	27.6	2175.8	736.4	2332	2175	7.740	2338.4	
2306	1991	1967	2.909	2.759	27.799	34.862	5.63	0.0	24.6	37.5	2190.2	814.0	2325	2205	7.665	2336.3	57.0
2307	1593	1575	2.988	2.872	27.700	34.749	4.96	0.0	29.4	47.1	2212.4	*926.2*	2325	2225	7.618	2337.7	
2308	1393	1378	3.086	2.986	27.610	34.650	4.02	0.0		47.0	2219.1	1014.9	2325	2229	7.599	2329.3	45.9
2309	1193	1181	3.143	3.059	27.486	34.503	4.27	0.0		47.8	2224.4	1070.5	2324	2225	7.612	2325.9	
2310	996	986	3.614	3.542	27.338	34.374	4.64	0.0	33.7	37.5	2203.5	1023.8	2338	2233	7.623	2309.7	48.6
2311	796	789	4.840	4.776	27.176	34.335	4.86	0.0		19.3	2175.0	910.3	2289	2188	7.617	2297.4	
2312	697	691	6.210	6.147	27.083	34.426		0.0	27.0	12.9	2160.2	843.0	2277	2188	7.556	2294.5	44.3
2313	596	591	7.978	7.917	26.964	34.588		0.0	23.7	9.0	2151.4	773.1	2272	2163	7.647	2300.4	
2314	496	492	10.292	10.233	26.791	34.842		0.2	17.3	4.4	2128.5	643.0	2289	2166	7.633	2310.2	64.1
2315	395	391	12.267	12.214	26.620	35.089	4.72	0.0	12.3	1.6	2112.5	561.3	2357	2189	7.734	2320.6	67.1
2316	299	297	14.257	14.213	26.395	35.324	4.75	0.0	7.4	0.0	2090.5		2322	2098	7.890		62.4
2317	248	246	15.482	15.443	26.254	35.488	4.88	0.0	4.5	0.0	2084.6		2327	2099	7.900		50.2
2318	199	197	17.035	17.002	26.088	35.746	4.87	0.0	2.4	0.0	2076.8		2347	2092	7.921		59.2
2319	149	148	19.048	19.021	25.824	36.057	5.02	0.0	0.0	0.0	2065.0		2357	2091	7.931		73.5
2320	102	101	21.125	21.105	25.611	36.498	5.03	0.0	0.0	0.0	2061.7	*333.5*	2396	2073	8.047	2393.8	83.4
2321	78	77	21.187	21.172	25.598	36.509	5.03	0.0	0.0	0.0	2064.3	316.5	2380	2087	7.963	2411.7	74.6
2322	43	43	21.173	21.165	25.598	36.504	5.04	0.0	0.0	0.0	2060.9	321.2	2395	2081	8.011	2403.3	61.9
2323	30	30	21.172	21.166	25.597	36.504	4.99	0.0	0.0	0.0	2063.2	315.9	2379	2100	7.943	2410.9	70.2
2324	3	3	21.162	21.161	25.599	36.513	5.07	0.0	0.0	0.0	2059.7	314.9	2393	2086	7.998	2407.3	88.1

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 29
Cast 24

Operation # 090208220.0
Date 7/27/1991
Time (GMT) 701

Latitude -27.00
Longitude -25.00
Bottom Depth 4806

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg
2401	1011	1001	3.661	3.587	27.310	34.349	4.72				2200.2	987.3	2302	2218	7.569	2311.9
2402	1010	1000	3.663	3.589	27.311		*4.63*	0.0	28.2	29.0	2200.9	992.6				2311.0
2403	904	895	4.198	4.129	27.233	34.321	4.94						2287	2197	7.589	
2404	901	893	4.235	4.166	27.230		4.93	0.0	26.8	22.4	2184.8	940.4				2302.8
2405	752	745	5.741	5.676	27.112	34.391	4.84						2288	2179	7.681	
2406	753	746	5.735	5.670	27.114		4.84	0.0	24.4	14.5	2166.8	871.1				2296.0
2407	631	626	7.681	7.617	26.983	34.558	4.70						2288	2164	7.681	
2408	632	626	7.667	7.603	26.983		4.69	0.0	20.4	9.3	2153.5	782.6				2300.6
2409	528	523	10.013	9.951	26.813	34.811	4.68						2288	2137	7.749	
2410	529	524	10.007	9.945	26.815		4.68	0.0	14.9	5.0	2132.5	651.6				2312.1
2411	400	397	12.897	12.842	26.572	35.189							2303	2113	7.806	
2412	401	397	12.888	12.833	26.571		4.72	0.0	8.0	1.9	2106.3	531.4				2325.7
2413	302	299	14.370	14.325	26.383	35.342	4.87						2322	2102	7.891	
2414	301	299	14.375	14.330	26.382		4.76	0.0	5.5	1.4	2093.4	470.4				2338.4
2415	201	200	16.814	16.781	26.102	35.694	4.93						2340	2095	7.921	
2416	202	200	16.814	16.781	26.102		4.92	0.0	1.4	0.0	2077.6	402.4				2359.0
2417	123	122	20.908	20.884	25.649	36.471	5.02						2388	2095	8.039	
2418	122	121	20.909	20.886	25.649		5.03	0.0	0.0	0.0	2065.4	319.7				2409.1
2419	83	82	20.965	20.949	25.651	36.501	5.02						2394	2090	8.003	
2420	84	83	21.026	21.010	25.642		5.03	0.0	0.0	0.0	2065.9	315.9				2414.0
2421	45	44	21.205	21.196	25.633	36.568	5.01						2394	2090	8.057	
2422	45	44	21.219	21.210	25.635			0.0	0.0	0.0	2069.6	317.6				2417.7
2423	6	6	21.205	21.204	25.634	36.568	5.00						2395	2088	8.007	
2424	7	7	21.202	21.201	25.633		4.99	0.0	0.0	0.0	2067.8	315.9				2417.1

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 31
Cast 25

Operation # 0912090234.0
Date 7/28/1991
Time (GMT) 423

Latitude -29.50
Longitude -28.50
Bottom Depth 4456

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2501	4182	4110	1.166	0.836	27.858	34.762	5.14	0.0	25.9	80.8	2243.1	949.5	2357	2264	7.608	2367.4	47.5
2502	4000	3933	1.353	1.038	27.858	34.770	5.18	0.0			2236.5	*926.8*	2350	2250	7.603	2363.9	38.3
2503	3499	3444	2.258	1.972	27.871	34.870	5.60	0.0			2194.9	781.3	2334	2210	7.714	2348.8	39.4
2504	2996	2953	2.691	2.447	27.860	34.905	5.65	0.0	18.1	30.3	2182.3	*750.7*	2325	2198	7.683	2342.1	35.6
2505	2497	2464	2.788	2.592	27.835	34.890	5.52	0.0	18.1	30.6	2183.9	795.1	2327	2209	7.701	2333.2	43.1
2506	1997	1972	2.784	2.635	27.766	34.809	5.06	0.0		39.2	2201.9	870.9	2329	2224	7.628	2336.8	46.8
2507	1696	1676	2.841	2.718	27.677	34.707	4.60	0.0	25.1	45.0	2220.9	970.1	2330	2242	7.657	2339.0	42.3
2508	1438	1422	2.932	2.830	27.571	34.586	4.35	0.0	28.6	47.5	2229.0	1053.4	2325	2247	7.568	2333.9	45.8
2509	1297	1283	3.052	2.960	27.482	34.490	4.37	0.0	28.2	42.4	2224.1	1072.2	2322	2228	7.608	2325.3	37.2
2510	1198	1186	3.205	3.120	27.412	34.418	4.50				2216.3	1039.1	2313	2235	7.565	2321.5	50.8
2511	1099	1088	3.370	3.292	27.350	34.361	4.71	0.0	29.3	34.1	2205.6	1014.7	2298	2215	7.573	2313.4	
2512	1002	992	3.713	3.640	27.271	34.307	5.01	0.0			2189.4	944.6	2289	2211	7.561	2307.1	50.6
2513	909	900	4.104	4.035	27.213	34.285	5.27	0.0	28.5	33.0	2175.9	896.4	2277	2192	7.575	2300.9	
2514	839	831	4.867	4.799	27.158	34.319	5.15	0.0	27.3	25.7	2167.4	874.9	2274	2189	7.568	2296.4	40.1
2515	800	792	5.095	5.029	27.130	34.317	5.29	0.0	26.3	19.7	2161.3	848.0	2292	2189	7.610	2294.2	
2516	700	693	6.596	6.531	27.045	34.444	4.94	0.0	25.5	15.3	2154.8	800.9	2280	2182	7.578	2297.5	53.5
2517	601	595	8.593	8.528	26.927	*35.152*	4.77	0.0	24.4	13.5	2112.7	548.4	2318	2126	7.861	2323.8	
2518	498	494	10.722	10.661	26.768	34.910	4.69	0.0	21.8	10.3	2126.0	614.2	2303	2141	7.757	2316.8	52.4
2519	401	398	12.847	12.792	26.592	35.199	4.79	0.0			2106.2	523.5	2321	2111	7.870	2328.8	69.2
2520	301	298	14.013	13.969	26.466	*35.375*	4.81	0.0	13.1	4.5	2097.4	481.6	2323	2115	7.855	2336.9	66.7
2521	202	201	16.070	16.038	26.199	35.597	4.91	0.0	8.3	2.2	2080.5	421.4	2338	2083	7.943	2350.6	72.0
2522	102	101	20.374	20.355	25.570	36.178	5.12	0.0	6.1	2.2	2050.7	320.0	2374	2070	8.003	2389.4	78.2
2523	54	53	20.373	20.363	25.567	36.181	5.12	0.2	1.7	0.0	2048.3	318.3	2368	2059	8.028	2387.9	80.8
2524	6	5	20.362	20.361	25.570	36.181	5.12	0.0	0.0	0.0	2049.3	316.7	2370	2072	7.993	2390.6	72.5

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 33
Cast 26

Operation #0912100249.0
Date 7/29/1991
Time (GMT) 127

Latitude -32.00
Longitude -32.00
Bottom Depth 3956

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2601	4151	4080	0.956	0.636	27.854	34.736	5.07	0.0	31.9	96.6	2250.5	970.9	2359	2256	7.634	2371.7	
2602	3992	3925	1.298	0.985	27.858	34.765	5.17	0.0	30.6	92.1	2237.9	937.0	2345	2256	7.521	2364.6	
2603	3493	3438	2.250	1.965	27.866	34.862	5.54	0.0	24.7	53.7	2197.4	812.5	2338	2216	7.666	2344.3	
2604	2995	2951	2.709	2.465	27.852	34.897	5.56	0.0	24.2	36.9	2187.5	777.0				2341.5	36.6
2605	2493	2460	2.786	2.591	27.812	34.860	5.34	0.0	24.7	40.8	2192.5	936.5	2324	2204	7.660	2314.0	
2606	1995	1971	2.857	2.708	27.730	34.771	4.78	0.0	29.4	50.6	2214.4	825.1	2324	2229	7.611	2360.3	53.0
2607	1796	1775	2.868	2.736	27.686	34.718	4.57	0.0	31.7	55.2	2223.2	998.4	2316	2230	7.570	2336.7	
2608	1597	1579	2.861	2.747	27.605	34.620	4.40	0.0	34.4	56.3	2228.2	1048.3	2324	2236	7.619	2333.9	38.3
2609	1397	1382	2.988	2.889	27.490	34.490	4.39	0.0	36.7	53.5	2224.3	1081.0	2312	2232	7.559	2324.2	
2610	1197	1184	3.303	3.217	27.355	34.358	4.74	0.0	35.2	40.8	2206.9	1029.4	2304	2214	7.619	2312.6	50.3
2611	998	988	3.982	3.907	27.227	34.294	5.23		36.8	24.4	2177.2	923.7	2287	2192	7.611	2297.3	
2612	900	891	4.681	4.609	27.168	34.303	5.22		32.7	19.1	2171.8	881.0	2282	2186	7.656	2299.3	40.2
2613	801	793	5.676	5.607	27.094	34.356	5.21	0.0	28.5	13.3	2157.1	826.6	2279	2174	7.637	2294.1	
2614	701	694	7.592	7.521	26.986	34.541	4.81	0.0	25.0	9.7	2150.3	760.9	2289	2165	7.724	2301.9	41.6
2615	601	596	9.338	9.270	26.868	34.733	4.71	0.0	20.6	6.2	2135.8	676.3	2292	2152	7.720	2308.3	
2616	400	396	13.535	13.478	26.577	35.356	4.97	0.0	9.6	0.9	2101.3	483.6	2325	2117	7.899	2341.6	52.3
2617	350	347	14.262	14.210	26.522	35.486	4.99	0.0	6.6	0.0	2093.7	458.1	2332	2113	7.877	2345.8	
2618	301	299	14.625	14.580	26.461	35.512	4.92				2092.8	449.6	2330	2112	7.918	2349.3	50.4
2619	250	248	15.339	15.300	26.341	35.558	4.86	0.0	6.5	0.0	2088.2	435.0	2331	2110	7.879	2351.8	50.5
2620	201	199	16.062	16.030	26.229	35.628	4.86	0.0	5.0	0.0	2081.5	423.8	2337	2101	7.904	2350.6	50.2
2621	152	151	17.523	17.497	26.042	35.843	4.92	0.0	4.3	0.0	2075.4	386.5	2345	2090	7.974	2367.4	49.1
2622	103	102	18.764	18.746	25.762	35.878	5.27	0.0	2.0	0.0	2044.4	*334.0*	2351	2061	7.990	2367.9	60.3
2623	44	43	18.749	18.741	25.762	35.876	5.28	0.2	0.0	0.0	2046.2	331.5	2350	2063	8.036	2372.2	52.1
2624	3	3	18.740	18.740	25.763	35.878	5.25	0.0	0.0	0.0	2044.3	*330.5*	2352	2065	7.997	2370.6	53.5

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 34
Cast 27

Operation # 0912100259.0
Date 7/29/1991
Time (GMT) 1355

Latitude -34.00
Longitude -32.00
Bottom Depth 4204

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2701	1999	1975	2.894	2.744	27.730	34.776	4.79	0.0	29.9	52.4	2212.3	922.8	2331	2216	7.670	2338.2	
2702	1999	1975	2.894	2.744	27.730		4.79	0.0	32.2	53.3							
2703	1853	1831	2.859	2.722	27.688	34.721	4.55	0.0	32.1	58.1	2224.2	922.5	2336	2224	7.650	2350.8	
2704	1723	1703	2.833	2.708	27.629	34.656	4.43	0.0	33.6	60.9			2331	2245	7.670		
2705	1724	1704	2.833	2.708	27.629		4.45	0.0	34.0	60.0	2229.0	1044.8				2335.4	
2706	1600	1581	2.829	2.715	27.577	34.581	4.37	0.0	35.2	60.7	2233.0	1067.5	2330	2239	7.612	2336.1	
2707	1498	1482	2.838	2.732	27.532	34.528	4.31	0.0	35.9	59.1							40.1
2708	1401	1386	2.901	2.803	27.473	34.462	4.50	0.0	37.0	55.3	2223.6	1088.4	2318	2235	7.570	2322.3	
2709	1201	1188	3.104	3.020	27.344	34.322	4.95	0.0	35.7	39.3	2205.0	1059.3	2306	2227	7.590	2305.8	40.0
2710	1100	1089	3.372	3.294	27.290	34.287	5.22	0.0	35.2	32.4							
2711	999	990	3.723	3.650	27.245	34.275	5.29	0.0	34.6	26.5	2178.1	1084.2	2290	2200	7.590	2273.3	
2712	901	892	3.933	3.866	27.201	34.248	5.55	0.0	34.2	21.3	2173.5	875.8	2292	2185	7.664	2302.0	
2713	871	863	3.998	3.933	27.188	34.240	5.56	0.0	31.4	20.0			2285	2175	7.641		43.3
2714	870	862	3.999	3.934	27.188		5.63	0.0	31.7	20.2	2164.1	871.2				2292.5	
2715	751	744	4.952	4.891	27.108	34.269	5.61	0.0	29.4	13.5	2154.0	806.0	2290	2166	7.710	2294.8	
2716	650	644	5.847	5.790	27.054	34.335	5.37	0.0	28.0	10.7			2282	2160	7.683		46.3
2717	652	646	5.799	5.742	27.056		5.46	0.0	27.0	10.7	2146.0	805.4				2286.1	
2718	501	497	9.294	9.238	26.855	34.713	4.92	0.0	20.0	5.3	2133.8	658.1	2288	2156	7.729	2311.2	50.5
2719	351	348	13.220	13.171	26.600	35.311	5.09	0.0	9.5	1.4	2097.7	508.7	2318	2126	7.816	2325.7	57.4
2720	251	249	14.109	14.072	26.534	35.465	5.10	0.0	6.9	0.9	2093.7	448.2	2336	2106	7.918	2350.8	41.5
2721	167	165	15.053	15.028	26.412	35.572	4.98	0.0	5.2	0.0	2086.4	433.2	2335	2106	7.890	2350.9	45.9
2722	103	102	15.988	15.972	26.088	35.433	5.44	0.0	0.0	0.0	2052.0	373.2	2333	2062	8.004	2345.3	82.7
2723	53	53	16.243	16.235	26.049	35.464	5.48	0.0	0.0	0.0	2047.5	363.3	2331	2066	7.961	2346.8	68.2
2724	2	2	16.436	16.436	26.016	35.476	5.58	0.0	0.0	0.0	2047.2	359.7	2329	2067	7.952	2349.2	81.5

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 35
Cast 28

Operation # 0912110267.5
Date 7/30/1991
Time (GMT) 123

Latitude -36.00
Longitude -32.00
Bottom Depth 4363

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2801	4424	4346	0.362	0.031	27.846	34.679	5.02				2263.2	1062.0	2355	2264	7.575	2370.5	
2802	3996	3929	0.946	0.643	27.846	34.725	4.94				2253.4	*1057.1*	2349	2266	7.594	2361.7	
2803	3493	3438	1.771	1.498	27.844	34.792	5.07				2228.0	928.3	2343	2239	7.655	2354.7	
2804	2995	2951	2.618	2.376	27.846	34.881	5.45				2193.9	811.0				2340.9	53.7
2805	2496	2462	2.910	2.712	27.810	34.871	5.28				2193.9	*831.5*	2321	2217	7.621	2336.3	
2806	1999	1974	2.914	2.763	27.717	*34.775*	4.62				2222.5	*962.2*	2331	2229	7.657	2342.3	36.6
2807	1700	1680	2.815	2.692	27.608	34.615	4.26				2202.6	*1077.9*	2335	2255	7.566	2301.2	
2808	1399	1384	2.789	2.692	27.470	34.443	4.41	0.0		66.7	2229.0	1099.4	2315	2230	7.601	2326.6	
2809	1201	1189	2.966	2.883	27.351	34.323	4.94	0.0	33.3		2202.2	1021.6	2311	2226	7.604	2308.4	
2810	1000	990	3.492	3.421	27.242	34.242	5.45				2179.3	920.2	2292	2185	7.664	2300.1	52.1
2811	899	891	3.882	3.816	27.198	34.234	5.61	0.0		31.2	2167.3	877.3	2278	2174	7.635	2294.8	
2812	801	793	4.478	4.416	27.140	34.241	5.71	0.0		21.7	2157.1	825.1	2276	2161	7.700	2294.0	39.9
2813	703	697	5.201	5.143	27.081	34.270	5.62	0.0		15.8	2146.3	783.7	2288	2173	7.665	2291.1	
2814	601	596	6.409	6.354	27.009	34.368	5.39	0.0		9.1	2144.3	762.1	2265	2165	7.639	2294.2	46.9
2815	501	497	8.592	8.538	26.883	34.606	5.03	0.0	19.7	2.3	2132.6	684.4	2287	2162	7.657	2301.8	
2816	402	398	11.275	11.224	26.723	34.984	4.88	0.0	11.8	0.6	2112.6	564.7	2322	2152	7.753	2318.9	56.9
2817	351	348	12.778	12.730	26.627	35.230	5.35	0.0	9.4	0.0	2100.1	*520.2*	2316	2159	7.740	2323.2	
2818	301	298	13.418	13.375	26.585	35.346	5.14	0.0	7.0	0.0	2098.7	*467.1*	2319	2104	7.904	2346.4	48.2
2819	253	251	14.051	14.014	26.544	35.462		0.1	5.8	0.0	2095.2	455.0	2339	2121	7.856	2349.1	62.3
2820	203	201	14.529	14.499	26.502	*35.552*	5.01	0.2	5.3	0.0	2094.7	*450.0*	2332	2117	7.893	2354.7	53.7
2821	172	170	14.925	14.899	26.452												
2822	104	103	15.366	15.350	26.194	35.383	5.44	0.3	3.6	0.0	2061.2	384.5	2334	2090	7.912	2348.6	53.0
2823	45	44	15.572	15.565	26.153	*35.415*	5.61	0.0	0.0	0.0	2052.8	373.5	2317	2069	7.973	2345.8	68.8
2824	2	2	15.585	15.585	26.151		5.60	0.0	0.0	0.0	2057.0	*373.7*	2317	2067	7.932	2350.6	65.2

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1
Station	36
Cast	29

Operation #	0912110292.0
Date	7/30/1991
Time (GMT)	1427

Latitude	-38.00
Longitude	-32.00
Bottom Depth	4540

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
2901	1999	1974	2.802	2.653	27.712	34.720	4.40	0.0			2231.7	1024.1	2324	2258	7.569	2342.0	45.4
2902	1999	1974	2.801	2.653	27.712	34.715	4.39	0.0		53.8							45.4
2903	1798	1777	2.791	2.661	27.648	34.638	4.22	0.0			2236.0	1074.5	2331	2263	7.528	2338.8	39.9
2904	1598	1580	2.751	2.639	27.560	34.525	4.26	0.0		54.9	2233.7	1126.6	2325	2249	7.599	2328.0	50.7
2905	1401	1385	2.776	2.680	27.469	34.415	4.53	0.0		49.1	2227.5	1083.9	2321	2247	7.550	2327.1	71.6
2906	1200	1188	2.991	2.909	27.359	34.306	5.07	0.0		36.3	2172.9	1005.9	2293	2187	7.667	2278.6	62.8
2907	1002	992	3.615	3.544	27.247	34.237	5.56	0.0		21.8	2158.2	903.8	2288	2172	7.700	2279.6	
2908	1002	992	3.614	3.543	27.248	34.241	5.59										57.6
2909	900	891	4.077	4.011	27.194	34.229	5.74	0.0		18.2							
2910	801	793	*4.463*	4.402	*27.154*	34.230	5.78	0.0		11.0	*2199.0*	*815.1*	2306	2213	7.599	2344.5	
2911	702	695	5.064	5.008	27.107	34.258	5.76	0.0		11.1	2149.7	*782.7*	2284	2167	7.660	2295.1	44.8
2912	603	597	6.203	6.151	27.041	34.371	5.46	0.0		8.5	2142.1	760.1	2275	2167	7.646	2292.1	
2913	498	494	8.330	8.280	26.928	34.588	5.04	0.0		4.9	2137.7	*691.8*	2282	2160	7.657	2305.5	32.1
2914	504	499	8.285	8.234	26.933	34.593	5.03	0.0		5.4							
2915	401	398	11.180	11.132	26.749	35.011	4.95	0.0		1.9	2114.4	*566.7*	2304	2130	7.824	2320.3	
2916	301	298	13.051	13.013	26.624	35.284	5.20	0.0		0.8	2101.0	479.6	2326	2120	7.846	2342.7	36.7
2917	255	253	13.615	13.582	26.586	35.380	5.16	0.0					2332	2107	7.924		
2918	256	254	13.611	13.578	26.584	35.375	5.14	0.0			2094.5	459.0				2345.6	57.9
2919	203	202	14.167	14.140	26.546	35.480	5.13	0.0		0.7	2095.3	449.5	2337	2110	7.901	2352.2	79.3
2920	156	155	14.556	14.536	26.465	35.486	5.11	0.0		0.0	2085.6	435.5	2330	2107	7.868	2348.1	
2921	152	151	14.567	14.547	26.459	35.476	5.12	0.0		0.0							78.0
2922	105	105	14.812	14.800	26.305	35.354	5.64	0.0		0.0	2060.3	387.4	2325	2093	7.893	2345.4	73.6
2923	56	56	14.904	14.899	26.292	35.369	5.67	0.0		0.0	2057.9	382.9	2326	2084	7.882	2345.6	72.3
2924	3	3	14.952	14.955	26.280	35.367	5.71	0.0		0.0	2058.9	382.4	2320	2084	7.874	2347.7	84.6

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation	#0912120306.0	Latitude	-40.00
Station	37	Date	7/31/1991	Longitude	-32.00
Cast	30	Time (GMT)	142	Bottom Depth	4743

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
3001	4784	4695	0.246	-0.121	27.849	34.669	5.12	0.0		116.6	2261.5	*1056.5*	2368	2282	7.565	2369.2	
3002	4497	4416	0.285	-0.052	27.848	34.679	5.06	0.0		115.7	2263.5	*1041.7*	2363	2264	7.631		
3003	3997	3930	0.620	0.326	27.841	34.690	4.92	0.0		112.7	2259.7	*1068.7*				2365.7	
3004	3497	3442	1.265	1.005	27.831	34.730	4.75	0.0		99.2	2253.9	*1034.3*	2353	2265	7.624	2364.8	
3005	2894	2852	2.227	2.004	27.826	34.816	4.99	0.0		61.1	2221.0	*912.5*	2342	2232	7.633	2350.0	
3006	2498	2464	2.643	2.450	27.800	34.832	4.98	0.0		45.7	2217.6	*899.9*	2334	2224	7.648	2348.7	
3007	1997	1973	2.791	2.642	27.715	34.745	4.49	0.0		51.9	2229.7		2335	2248	7.581		
3008	1701	1682	2.822	2.699	27.641	34.658	4.27	0.0		50.3	2238.4	*1072.8*	2326	2232	7.611	2341.5	
3009	1498	1482	2.745	2.640	27.568	34.561	4.18	0.0		45.3	2238.7	*1115.2*	2324	2237	7.599	2335.3	
3010	1199	1187	2.808	2.727	27.416	34.381	4.59	0.0		44.5	2224.3	*1084.9*	2316	2236	7.564	2323.3	
3011	1001	991	3.085	3.017	27.331	34.308	5.00	0.0		34.9	2201.4	*1008.3*	2307	2222	7.584	2309.7	49.7
3012	799	791	3.731	3.674	27.209	34.230	5.58	0.0		19.8	2174.3	*883.8*	2292	2178	7.674	2301.3	
3013	701	695	4.015	3.964	27.164	34.213	5.83	0.0		13.5	2158.0	*832.5*	2285	2170	7.666	2293.3	
3014	601	596	4.457	4.411	27.118	34.213	6.13	0.0		8.1	2146.3	*784.6*	2272	2163	7.656	2290.7	
3015	505	500	4.900	4.860	27.078	34.226	6.03	0.0		7.6	2143.4	*765.8*	2277	2166	7.638	2291.8	56.1
3016	400	397	6.073	6.038	27.015	*34.381*	5.52	0.0		8.5	2142.1	*761.0*	2279	2147	7.719	2291.8	
3017	301	299	7.868	7.838	26.899	34.485	5.46			5.2	2128.2	*658.3*	2284	2141	7.725	2303.8	
3018	256	254	9.431	9.402	26.795	34.679	5.17			4.1	2122.6	*627.7*	2296	2139	7.753	2307.5	
3019	205	203	11.299	11.273	26.687	34.959	4.87			2.9	2116.0	*502.7*	2308	2119	7.823	2348.1	73.2
3020	153	152	13.296	13.275	26.553	35.280	4.88			1.4	2106.0	*499.7*	2325	2126	7.832	2339.3	58.1
3021	106	105	14.403	14.387	26.452												
3022	84	83	14.511	14.499	26.341	35.335	5.23			0.6	2077.0	*425.5*	2329	2083	7.945	2342.5	57.2
3023	45	45	14.613	14.606	26.271	35.272	5.61			1.5	2064.2	*395.1*	2332	2084	7.925	2344.8	74.2
3024	0	0								0.8	2062.2	*395.6*	2332	2090	7.915	2342.1	88.0

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	1	Operation #	0912120322.0	Latitude	-42.00
Station	38	Date	7/31/1991	Longitude	-32.00
Cast	31	Time (GMT)	1444	Bottom Depth	4593

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
3101	4794	4705	0.336	-0.035	27.847	34.682	5.07			124.6	2261.5	*1063.9*	2364	2297	7.611	2369.1	
3102	4499	4418	0.419	0.078	27.846	34.688	5.03			126.5	2261.9	*1071.3*	2367	2288	7.558	2368.7	
3103	4002	3935	0.829	0.529	27.838	34.705	4.86			128.4	2256.3	*1066.0*	2364	2270	7.635	2362.4	
3104	3498	3443	1.379	1.116	27.829	*34.754*	4.72			115.0	2251.5	*1034.3*	2369	2282	7.576	2362.3	
3105	2999	2955	2.128	1.897	27.821	34.803	4.92			100.7	2227.0	*935.0*				2353.1	
3106	2493	2460	2.728	2.534	27.799	34.843	5.07			71.2	2210.0	*890.4*	2339	2228	7.676	2342.1	
3107	1992	1968	2.890	2.740	27.712	34.756	4.49			55.0	2223.8	*980.2*	2339	2245	7.604	2340.0	
3108	1498	1481	2.739	2.634	27.534	34.518	4.24			48.1	2240.1	*1110.8*	2319	2252	7.537	2337.3	51.0
3109	1003	993	3.210	3.141	27.287	34.274	5.28			57.8	2188.9	*953.5*	2296	2223	7.550	2304.9	
3110	903	894	3.537	3.473	27.236	34.245	5.56			46.6	2180.1	*907.3*	2277	2205	7.564	2303.4	44.2
3111	802	794	3.903	3.845	27.188	*34.240*	5.65			34.3	2165.7	*863.3*	2291	2205	7.575	2295.7	57.3
3112	701	695	4.331	4.278	27.141	34.225	5.81			25.3	2154.8	*814.5*	2289	2177	7.657	2294.2	82.2
3113	602	597	4.789	4.742	27.094	34.232	5.94			20.0	2144.3	*774.2*	2282	2171	7.655	2290.7	58.6
3114	503	499	5.402	5.361	27.056	34.282	5.77			13.6	2144.9	*760.3*	2283	2139	7.749	2294.2	65.9
3115	403	400	7.094	7.056	26.956	34.423	5.40			12.3	2134.9	700.1	2263	2185	7.573	2299.3	80.5
3116	353	350	8.749	8.711	26.858	34.611	5.24			8.9	2127.0	647.2	2301	2152	7.698	2306.3	75.9
3117	327	324	9.467	9.430	26.807	34.691	5.19			6.7	2118.1	615.8	2311	2163	7.689	2306.2	67.3
3118	302	299	10.478	10.442	26.759	34.851	5.08			4.6	2117.1	583.2	2303	2121	7.806	2316.8	76.2
3119	278	275	11.751	11.715	26.683	35.053	5.59			2.9	2092.0	*487.2*	2325	2124	7.828	2327.2	73.3
3120	252	250	11.380	11.348	26.659	34.932	5.86			1.1	2084.8	482.8	2311	2091	7.890	2319.1	90.4
3121	202	201	12.019	11.993	26.656	35.086	5.82				2081.7	461.8	2316	2089	7.904	2331.0	87.4
3122	104	103	12.053	12.039	26.651					1.3	2085.8	431.1	2316	2089	7.904	2348.5	91.8
3123	44	44	12.026	12.020	26.639	35.065	5.87			0.8	2081.6	*393.0*	2318	2109	7.853	2366.1	78.0
3124	8	8	12.040	12.039	26.638	35.072	5.80			0.0	2083.4	445.7	2321	2097	7.907	2337.7	88.6

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 38
Cast 32

Operation # 0912160397.0
Date 8/4/1991
Time (GMT) 240

Latitude -39.08
Longitude -48.55
Bottom Depth 5392

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
3201	1008	998	2.971	2.903	27.324	34.258	5.31	0.0		29.9	2192.9	*957.0*	2301	2206	7.600	2308.7	
3202	901	892	3.281	3.219	27.268	34.223	5.67	0.0		23.3	2181.6	913.6	2308	2211	7.591	2303.6	
3203	819	811	3.589	3.531	27.235	34.221	5.88	0.0		19.5	2168.5	857.5	2298	2184	7.677	2300.0	
3204	739	733	4.062	4.007	27.209	34.247	5.71	0.0		17.7	2168.2	856.0	2292	2184	7.631	2300.0	
3205	660	654	4.741	4.689	27.175	34.296	5.34	0.0		15.7	2164.9	854.0	2284	2170	7.685	2296.9	
3206	579	574	5.072	5.025	27.132	34.291	5.38	0.0		11.5	2155.6	810.4	2284	2170	7.652	2295.6	
3207	514	510	5.515	5.472	27.097	34.314	5.54	0.0		9.9	2150.6	789.4	2290	2172	7.664	2294.7	
3208	445	442	6.330	6.290	27.060	34.397	5.23	0.0		8.8	2151.1	779.5	2287	2162	7.711	2297.8	
3209	365	361	7.064	7.029	26.979	34.421	4.98	0.0		6.5	2137.6	724.3	2289	2151	7.748	2296.2	
3210	286	283	9.113	9.081	26.857	34.658	4.92	0.0		3.7	2130.4	652.2	2294	2147	7.741	2308.5	
3211	211	209	11.608	11.581	26.674	34.984		0.0		1.7	2115.2	554.6	2282	2125	7.749	2325.8	
3212	159	158	13.281	13.259	26.585	35.293		0.0		0.0	2093.0	455.7	2313	2114	7.807	2345.2	
3213	110	109	13.014	12.999	26.537	35.162		0.3		0.0	2080.0	442.4				2335.8	
3214	69	69	12.987	12.978	26.535	35.154		0.4		0.0	2082.0	442.6	2320	2095	7.904	2338.1	
3215	1	1	12.919	12.919	26.524	35.125	5.74	0.4		0.0	2080.4	445.7	2322	2108	7.863	2334.4	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 1
Station 38
Cast 33

Operation # 0912160398.0
Date 8/4/1991
Time (GMT) 628

Latitude -39.08
Longitude -48.55
Bottom Depth 5392

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK uEq/Kg	TCO2 (titr.) umol/Kg	pH	TALK (calc.) uEq/Kg	DOC umol/L
3301	5342	5236	0.249	-0.183	27.869	34.669	5.13				2263.7	1061.3	2367	2290	7.548	2371.1	
3302	5089	4991	0.249	-0.154	27.869	34.672					2264.0	1071.1	2365	2291	7.599	2370.0	
3303	4889	4797	0.264	-0.115	27.869	34.673	5.15				2263.1	1070.0	2365	2289	7.549	2369.2	
3304	4594	4511	0.310	-0.038	27.867	34.676	5.11				2267.5	1071.1	2371	2292	7.615	2373.9	
3305	4288	4213	0.461	0.140	27.864	34.684	5.05				2262.0	1063.8	2366	2286	7.561	2369.0	
3306	3971	3905	0.836	0.538	27.859	34.705	4.89				2259.5	1059.7	2367	2271	7.619	2366.9	
3307	3691	3631	1.119	0.843	27.852	34.720	4.80			93.3	2256.8	1040.5	2364	2278	7.575	2367.0	
3308	3395	3342	1.489	1.233	27.845	34.744	4.77			85.7	2251.8	1022.6	2364	2271	7.573	2364.5	
3309	3093	3047	1.983	1.745	27.845	34.790	4.93			68.7	2233.3	*946.0*	2375	2253	7.579	2357.4	
3310	2794	2754	2.526	2.306	27.848	34.850	5.19			48.4	2212.6	*862.7*	2352	2239	7.670	2350.6	
3311	2596	2561	2.722	2.518	27.835	34.856	5.21			45.8	2201.0	*826.0*	2335	2258	7.582	2345.4	
3312	2497	2463	2.767	2.572	27.823	34.847	5.13			43.5	2208.5	870.4	2332	2262	7.571	2344.4	
3313	2392	2360	2.862	2.676													
3314	2195	2167	2.926	2.757	27.779	34.812				45.0	2215.7	924.9				2341.7	
3315	1990	1965	2.901	2.751	27.734	34.755	4.54			49.6	2221.7	990.7	2340	2252	7.615	2336.5	
3316	1796	1775	2.929	2.797	27.686	34.701	4.43			50.3	2230.3	1037.0	2362	2255	7.577	2338.2	
3317	1697	1678	2.869	2.746	27.653	34.653	4.33			52.6	2231.6	1068.4	2362		7.558	2334.6	
3318	1597	1579	2.847	2.732	27.619	34.609	4.28			52.8	2231.1	1091.9	2349	2259	7.499	2330.4	
3319	1498	1481	2.808	2.702	27.579	34.556	4.31			50.2	2231.6	1108.8	2325	2245	7.545	2328.4	
3320	1395	1380	2.800	2.703	27.541	34.507	4.35			48.2	2235.6	1113.0	2335	2234	7.561	2332.0	
3321	1298	1284	2.832	2.742	27.486	34.443	4.39			45.6	2223.8	1102.5	2327	2242	7.573	2320.3	
3322	1199	1186	2.878	2.796	27.435	34.386	4.64			42.8	2220.0	1076.3	2315	2232	7.554	2319.8	
3323	1103	1092	2.804	2.730	27.364	34.289	5.41				2195.6	991.0				2305.7	
3324	999	989	2.805	2.739	27.322	34.237					2186.2	928.2				2306.2	

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 2
Cast 1

Operation # 912300570
Date 8/18/1991
Time (GMT) 1337

Latitude -24.13
Longitude -33.46
Bottom Depth 4613

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK (calc.) uEq/Kg
101	4406	4328	1.206	0.850	27.865	*34.835*	5.89				2208.8	815.8	2374
102	3996	3929	1.809	1.481	27.876	34.833	5.54					826.1	
103	3696	3636	2.301	1.992	27.879	34.884	5.70					772.9	
104	3295	3245	2.663	2.389	27.872	34.916	5.82				2177.1	742.4	2299
105	2997	2954	2.807	2.561	27.865	34.924	5.74				2177.8	748.5	2295
106	2696	2659	2.953	2.734	27.856	34.936	5.76				2175.3	739.2	2297
107	2300	2270	3.176	2.992	27.842	34.948	5.78				2172.3	736.7	2299
108	1996	1971	3.408	3.250	27.816	*34.960*	5.85				2171.7	749.5	2315
109	1696	1677	3.399	3.269	27.759	34.873	5.14				2173.0	820.7	2309
110	1496	1479	3.159	3.049	27.671	34.736	4.63				2213.7	942.6	2293
111	1400	1385	3.103	3.002	27.618	34.667	4.42				2220.2	1007.8	2293
112	1302	1288	3.128	3.035	27.557	34.591	4.30				2224.7	1043.5	2287
113	1200	1188	3.256	3.170	27.490	34.527	4.26				2222.8	1065.3	2281
114	1102	1091	3.442	3.363	27.418	34.456	4.31				2217.5	1064.3	2283
115	1000	990	3.865	3.791	27.335	34.406	4.35				2206.8	1041.2	2281
116	851	842	4.908	4.839	27.212	34.392	4.35				2192.1	996.3	2292
117	702	695	7.147	7.079	27.051	34.545	4.08				2175.4	902.1	2323
118	554	549	9.992	9.927	26.823	34.818	4.17				2144.5	715.3	2373
119	400	397	13.573	13.516	26.472	35.234	4.83				2104.6	517.6	2315
120	303	301	15.820	15.772	26.218	35.542	4.90				2080.8	426.5	2335
121	203	201	18.353	18.318	25.947	*36.028*	4.79				2080.2	382.9	2368
122	154	152	21.814	21.784	25.636	36.784	4.91				2074.1	314.0	2420
123	53	53	21.784	21.773	25.628	36.768	4.92				2072.1	313.1	2420
124	5	5	21.786	21.785	25.625	36.770	5.00				2072.0	312.6	2420

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 2
Cast 2

Operation # 912320636
Date 8/20/1991
Time (GMT) 1330

Latitude -19.00
Longitude -25.00
Bottom Depth 5652

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK (calc.) uEq/Kg
201	2000	1976	3.276	3.119	27.824	34.940	5.65			23.6	2171.9	734.6	2307
202	1747	1727	3.454	3.318	27.785	34.913	5.45			24.3	2177.7	787.2	2309
203	1502	1485	3.701	3.584	27.708	34.848	4.77			27.6	2189.3	852.0	2306
204	1301	1287	3.792	3.692	27.613	34.741	4.38			30.5	2202.1	960.7	2300
205	1102	1091	3.705	3.623	27.494	34.583	*2.84*			36.0	2212.1	1050.1	2293
206	1000	990	3.721	3.647	27.439	34.518	4.13			37.6	2213.3	1076.5	2286
207	900	891	3.857	3.791	27.383	34.464	4.07			35.0	2211.5	1095.2	2288
208	803	795	4.320	4.259	27.300								
209	701	694	5.005	4.948	27.230	34.431	4.21			24.7	2200.2	1053.1	2293
210	651	645	5.631	5.575	27.180	34.463	3.80			21.2	2195.2	1037.4	2307
211	600	594	6.323	6.269	27.130	34.508	3.70			18.2	2192.2	1008.0	2314
212	552	547	7.193	7.140	27.066	34.578	3.81			14.8	2184.1	964.5	2330
213	500	496	8.101	8.049	26.996								
214	452	448	9.252	9.202	26.898	34.757	3.62			9.0	2166.3	840.6	2366
215	402	398	9.954	9.907	26.835		3.60			7.2	2158.9	780.4	2373
216	351	348	11.230	11.186	26.713								
217	301	299	12.691	12.650	26.551		4.26			2.2	2120.1	581.5	2309
218	250	248	14.567	14.530	26.345		4.76			0.0	2099.8	493.1	2328
219	201	199	16.784	16.751	26.106		4.58			0.0	2090.0	429.0	2348
220	152	151	19.962	19.934	25.806		4.80			0.0	2086.9	359.8	2387
221	101	100	22.688	22.667	25.523		4.91						
222	101	100	22.689	22.668	25.522					0.0	2085.2	315.2	2433
223	56	56	22.694	22.683	25.520		4.90			0.0	2084.6	314.3	2433
224	3	3	22.693	22.692	25.517								

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 2
Cast 3

Operation # 912370750
Date 8/25/1991
Time (GMT) 1553

Latitude -2.00
Longitude -4.50
Bottom Depth 4967

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK (calc.) uEq/Kg
301	5013	4917	2.180	1.720	27.881	34.863	5.56			56.3	2206.1	779.0	2381
302	4495	4414	2.237	1.839	27.881	34.871	5.57			52.8	2202.2	779.9	2381
303	3995	3928	2.336	1.993	27.879	34.885	5.57			48.5	2198.0	771.3	2381
304	3495	3440	2.456	2.165	27.876	34.897	5.80			44.0	2192.5	771.2	2304
305	2996	2952	2.602	2.360	27.866	34.906	5.48			41.6	2193.1	773.8	2306
306	2496	2462	2.951	2.752	27.849	34.926	5.53			33.2	2183.8	764.9	2310
307	2055	2030	3.505	3.340	27.822	34.961	5.66			20.4	2169.7	741.8	2316
308	1799	1777	3.759	3.614	27.795	34.961	5.47			18.7	2172.0	761.5	2319
309	1598	1580	4.053	3.923	27.763	34.961	5.36			17.1	2174.0	779.4	2322
310	1398	1383	4.354	4.239	27.692	34.912	5.08			18.2	2185.3	859.7	2326
311	1198	1185	4.426	4.329	27.596	34.804	4.16			24.2	2202.0	973.4	2314
312	1000	990	4.394	4.315	27.413	*34.629*	3.59			30.8	2222.0	1134.0	2300
313	909	900	4.635	4.562	27.355	34.533	3.46			30.1	2220.6	1176.7	2296
314	790	783	4.785	4.722	27.301	34.487	3.29			28.8	2218.3	1164.8	2298
315	702	695	5.186	5.128	27.253								
316	601	596	5.849	5.797	27.202	34.527	3.40			23.5	2210.8	1141.3	2309
317	506	502	6.181	6.136	27.172	34.540	3.26			20.6	2205.9	1101.1	2313
318	403	400	7.205	7.166	27.100	34.625	3.02			17.0	2205.0	1101.1	2330
319	302	299	9.804	9.769	26.921								
320	229	227	12.567	12.536	26.661	35.226	2.02			7.8	2196.8	929.2	2315
321	178	176	13.212	13.187	26.592	35.303	2.81			6.3	2179.9	805.4	2322
322	75	75	15.064	15.053	26.382	35.543	2.27			4.7	2178.1	749.8	2335
323	41	40	16.238	16.232	26.182								
324	4	4	22.199	22.198	24.537	35.492	4.94			1.2	2042.6	354.9	2335

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg	2	Operation	# 912410817	Latitude	-0.09
Cast	4	Date	8/29/1991	Longitude	-17.65
		Time (GMT)	551	Bottom Depth	5908

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) µatm	TALK (calc.) uEq/Kg
401	5765	5646	1.194	0.674	27.866	34.753	5.25			92.1	2242.8	912.0	
402	5494	5383	1.159	0.675	27.868	*34.761*	5.24			91.9	2242.2	920.4	
403	5243	5141	1.132	0.680	27.867	34.750	5.25			91.9	2243.7	921.7	
404	4995	4900	1.115	0.694	27.867	34.753	5.25			90.9	2240.4	922.3	
405	4747	4659	1.122	0.730	27.869	34.756	5.30			90.6	2242.3	915.0	
406	4545	4463	1.189	0.818	27.871	34.766	5.34			86.9	2236.2	905.3	
407	4244	4170	1.586	1.237	27.880	34.812	5.55			67.3	2215.7	832.3	
408	3996	3929	2.149	1.811	27.887	34.874	5.82			43.3	2186.5	766.5	2381
409	3496	3441	2.456	2.165	27.879	34.900	5.77			37.3	2183.2	755.0	2297
410	2997	2953	2.699	2.455	27.866	34.914	5.63			35.7	2184.2	762.2	2300
411	2494	2460	2.966	2.767	27.854	34.931	5.64			29.3	2176.2	753.6	2304
412	1997	1972	3.544	3.384	27.821	34.965	5.71			19.0	2165.7	741.3	2303
413	1450	1434	4.361	4.241	27.708	34.932	4.89			18.2		832.6	
414	999	989	4.515	4.435	27.409	34.582	3.52			30.1	2218.2	1134.1	2301
415	750	743	5.017	4.956	27.271	34.482	3.59			26.8	2211.2	1156.2	2300
416	649	643	5.679	5.623	27.222	34.520	3.27			23.7	2209.7	1159.3	2307
417	553	548	6.548	6.497	27.150	34.571	3.18			19.6	2202.4	1109.6	2323
418	452	448	8.265	8.218	27.030	34.731	2.59			12.0	2206.1	1125.8	2348
419	351	348	9.508	9.468	26.951	*34.737*	2.36			13.1	2211.7	1137.8	2361
420	252	250	12.687	12.653	26.646	*34.880*	3.07			11.9	2178.2	811.6	2295
421	155	153	13.337	13.315	26.579	35.316	2.80			6.2	2166.3	740.1	2322
422	105	104	16.993	16.976	26.147	*35.802*	3.35			5.0	2136.7	543.2	2355
423	57	57	22.604	22.592	24.758	35.926	4.27			2.2	2065.4	370.6	2361
424	3	3	24.076	24.075	24.126	35.666	4.86			0.0	2022.6	319.2	2348

NOAA South Atlantic 1991 Long Lines

Niskin Bottle hydrographic data

Leg 2
Cast 5

Operation # 912420841
Date 8/30/1991
Time (GMT) 2119

Latitude -3.00
Longitude -25.00
Bottom Depth 5023

Sample #	Pres. db	Depth m	Temp. deg. C	Pot. T. deg. C	Sigma theta	Salinity	Oxygen mL/L	NO2 umol/L	NO3 umol/L	SiO4 umol/L	TCO2 (coul.) umol/Kg	fCO2 (20 deg.) uatm	TALK (calc.) uEq/Kg
501	4998	4903	0.726	0.318	27.857	34.714	5.09			114.6	2256.5	980.8	2367
502	4498	4417	0.941	0.583	27.865	34.742	5.22			103.7	2246.2	941.7	2367
503	3994	3927	1.941	1.609	27.886	34.855	5.75			55.6	2195.9	777.0	2381
504	3498	3443	2.501	2.209	27.882	34.909	5.87			35.0	2177.9	740.0	2298
505	2996	2953	2.633	2.391	27.868	34.911	5.65			39.0	2186.1	762.9	2299
506	2499	2466	2.965	2.766	27.854	34.933	5.70			30.9	2178.3	747.8	2303
507	1999	1975	3.476	3.316	27.823	34.960	5.70			21.9	2169.6	744.1	2316
508	1796	1775	3.745	3.601	27.805	34.972	5.68			18.6		744.0	
509	1598	1580	4.064	3.934	27.769	34.971	5.38			18.2	2167.3	765.9	2323
510	1400	1384	4.331	4.216	27.702	34.921	4.89			21.1	2185.6	844.6	2319
511	1200	1188	4.363	4.267	27.559	34.765	4.03			29.4	2208.5	1016.6	2313
512	1102	1091	4.312	4.225	27.487	34.655	3.86			31.8	2214.9	1070.3	2306
513	1001	991	4.328	4.250	27.404	34.552	3.70			33.6	2218.7	1124.9	2299
514	901	892	4.436	4.365	27.361	34.514	3.69			33.2		1130.8	
515	801	793	4.553	4.490	27.320	34.480	3.70			32.2	2211.5	1124.0	2289
516	701	694	4.771	4.715	27.279	34.458	3.72			30.3	2207.6	1126.3	2291
517	600	595	5.508	5.457	27.216	34.489	3.35			24.7	2207.8	1144.6	2299
518	501	497	6.715	6.668	27.142	34.591	2.71			21.0	2215.2	1221.4	2325
519	402	399	8.833	8.789	26.996	34.801	1.70			15.8	2226.8	1313.4	2365
520	294	292	11.374	11.337	26.769	35.070	2.59			9.2	2182.3	886.1	2310
521	204	202	12.785	12.757	26.637	35.252	2.04			8.1	2192.2	910.5	2322
522	106	105	14.791	14.775	26.411	35.504	2.36			5.5	2174.5	756.2	2340
523	66	66	22.046	22.033	25.021	35.553	3.77			0.0	2095.1	408.7	2374
524	3	3	25.381	25.380	23.934	35.934				0.0	2025.5	305.0	2368

APPENDIX C: Station Data for Productivity Casts

Casts are presented by cruise leg and in increasing cast number. The cruise leg number, the productivity cast number, geographic coordinates, operation number, and date are shown at the top of each data table. Data values that are suspect for various reasons are italicized. A blank space is left when either no data was collected, or the value was known to be in error. All coordinates are in fractional degrees with negative values indicating south or west.

NOAA South Atlantic 1991 Productivity Casts

Leg 1 | Operation # 911960021 | Latitude 4.00
Productivity Cast 2 | Date 7/15/1991 | Longitude -24.99

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
	0.00	1	0.00			0.27		
	0.00	5	-0.69			0.24		
	0.00	10	-1.20			0.00		
	0.00	25	-1.90			0.24		
	0.00	45	-2.81			0.27		
	0.00	75	-4.60			0.23		

Leg 1 | Operation # 911970041 | Latitude 0.81
Productivity Cast 3 | Date 7/16/1991 | Longitude -25.00

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.35	1	0.00	0.69	16.54	0.27	62.17	0.00
36	24.35	9	-0.69	0.90	21.55	0.30	72.08	0.00
36	24.35	15	-1.20	0.97	23.21	0.35	67.27	0.00
36	24.35	24	-1.90	0.74	17.74	0.38	46.19	0.00
36	24.35	35	-2.81	0.83	19.82	0.61	32.50	0.00
36	24.35	58	-4.60	0.32	7.70	0.25	30.33	0.00

Leg 1 | Operation # 911980057 | Latitude -2.00
Productivity Cast 4 | Date 7/17/1991 | Longitude -25.02

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.35	1	0.00	0.57	13.61	0.19	73.16	0.36
36	24.35	9	-0.69	0.65	15.53	0.18	88.23	0.34
36	24.35	20	-1.20	0.76	18.29	0.19	96.76	0.35
36	24.35	28	-1.90	0.76	18.12	0.22	83.89	0.42
36	24.35	45	-2.81	0.60	14.38	0.23	62.78	0.44
36	24.35	78	-4.60	0.25	5.90	0.00		0.00

Leg 1 | Operation # 912010102 | Latitude -4.00
Productivity Cast 5 | Date 7/20/1991 | Longitude -25.00

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.10	2.42	0.12	19.87	0.21
36	24.00	9	-0.69	0.12	2.76	0.11	24.64	0.21
36	24.00	27	-1.20	0.09	2.04	0.12	16.72	0.23
36	24.00	42	-1.90	0.09	2.06	0.12	17.20	0.20
36	24.00	58	-2.81	0.05	1.18	0.23	5.11	0.45
36	24.00	86	-4.60	0.01	0.14	0.14	1.04	0.35

NOAA South Atlantic 1991 Productivity Casts

Leg 1 | Operation # 912020116 | Latitude -7.15
Productivity Cast 6 | Date 7/21/1991 | Longitude -25.28

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.04	0.84	0.11	7.93	0.17
37	24.00	30	-0.69	0.00	0.00	0.10	0.00	0.16
37	24.00	38	-1.20	0.00	0.00	0.09	0.00	0.15
37	24.00	55	-1.90	0.04	0.98	0.11	9.28	0.16
37	24.00	83	-2.81	0.00	0.00	0.13	0.00	0.23
37	24.00	145	-4.60	0.00	0.00	0.04	0.00	0.11

Leg 1 | Operation # 912030139 | Latitude -10.54
Productivity Cast 7 | Date 7/22/1991 | Longitude -24.01

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.03	0.77	0.06	12.39	0.16
37	24.00	7	-0.69	0.04	0.96	0.07	14.33	0.16
37	24.00	20	-1.20	0.03	0.72	0.07	10.14	0.16
37	24.00	40	-1.90	0.02	0.38	0.07	5.91	0.15
37	24.00	65	-2.81	0.02	0.53	0.08	6.60	0.16
37	24.00	121	-4.60	0.03	0.62	0.16	4.03	0.45

Leg 1 | Operation # 912040154 | Latitude -13.59
Productivity Cast 8 | Date 7/23/91 | Longitude -25.01

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.02	1	0.00	0.02	0.53	0.05	11.00	0.11
37	24.02	10	-0.69	0.02	0.36	0.05	7.06	0.11
37	24.02	17	-1.20	0.02	0.53	0.05	11.23	0.11
37	24.02	40	-1.90	0.01	0.17	0.05	3.43	0.11
37	24.02	70	-2.81	0.02	0.46	0.05	9.31	0.12
37	24.02	134	-4.60	0.00		0.09		0.29

Leg 1 | Operation # 912050173 | Latitude -16.98
Productivity Cast 9 | Date 7/24/91 | Longitude -24.99

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.00	0.10	0.05	1.96	0.12
37	24.00	10	-0.69	0.02	0.36	0.05	7.06	0.11
37	24.00	22	-1.20	0.09	2.23	0.04	50.73	0.11
37	24.00	45	-1.90	0.10	2.47	0.05	53.74	0.11
37	24.00	79	-2.81	0.10	2.28	0.05	47.50	0.12
37	24.00	143	-4.60	0.06	1.44	0.09	16.36	0.31

NOAA South Atlantic 1991 Productivity Casts

Leg 1 | Operation # 912060194 | Latitude -20.24
Productivity Cast 10 | Date 7/25/1991 | Longitude -25.03

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.03	0.65	0.06	11.17	0.13
37	24.00	17	-0.69	0.03	0.72	0.04	20.57	0.08
37	24.00	29	-1.20	0.11	2.59	0.05	55.15	0.10
37	24.00	46	-1.90	0.13	3.14	0.07	46.93	0.14
37	24.00	68	-2.81	0.06	1.34	0.05	24.89	0.13
37	24.00	112	-4.60	0.14	3.26	0.07	50.22	0.14

Leg 1 | Operation # 912070211 | Latitude -23.99
Productivity Cast 11 | Date 7/26/1991 | Longitude -24.99

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.13	3.10	0.06	56.29	0.13
37	24.00	19	-0.69	0.13	3.17	0.06	52.80	0.13
37	24.00	33	-1.20	0.07	1.61	0.06	28.21	0.14
37	24.00	53	-1.90	0.12	2.95	0.06	50.03	0.13
37	24.00	78	-2.81	0.11	2.54	0.05	47.11	0.13
37	24.00	128	-4.60	0.08	1.94	0.07	27.77	0.16

Leg 1 | Operation # 912080226 | Latitude -27.56
Productivity Cast 12 | Date 7/27/1991 | Longitude -25.87

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.10	2.45	0.03	81.60	0.06
37	24.00	16	-0.69	0.20	4.73	0.03	152.52	0.06
37	24.00	24	-1.20	0.17	3.98	0.03	132.80	0.07
37	24.00	43	-1.90	0.18	4.27	0.03	147.31	0.07
37	24.00	64	-2.81	0.10	2.33	0.12	19.08	0.28
37	24.00	105	-4.60	0.15	3.60	0.12	30.77	0.26

Leg 1 | Operation # 912090282 | Latitude -30.31
Productivity Cast 13 | Date 7/28/1991 | Longitude -29.63

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.03	0.74	0.04	20.67	0.09
36	24.00	18	-0.69	0.05	1.13	0.03	35.25	0.08
36	24.00	32	-1.20	0.04	0.89	0.09	9.76	0.23
36	24.00	50	-1.90	0.05	1.15	0.13	9.22	0.23
36	24.00	74	-2.81	0.04	1.06	0.07	15.76	0.20
36	24.00	121	-4.60	0.01	0.22	0.00		0.00

NOAA South Atlantic 1991 Productivity Casts

Leg 1 | Operation # 912100256 | Latitude -33.99
Productivity Cast 14 | Date 7/29/1991 | Longitude -32.00

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
35	24.00	1	0.00	0.25	6.00	0.16	38.71	0.32
35	24.00	11	-0.69	0.27	6.55	0.14	47.14	0.34
35	24.00	19	-1.20	0.23	5.42	0.15	37.41	0.31
35	24.00	30	-1.90	0.26	6.14	0.15	40.96	0.36
35	24.00	44	-2.81	0.18	4.25	0.19	22.01	0.43
35	24.00	72	-4.60	0.33	7.90	0.15	54.46	0.27

Leg 1 | Operation #912110291 | Latitude -38.01
Productivity Cast 15 | Date 7/30/1991 | Longitude -31.99

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
35	24.00	1	0.00	0.26	6.24	0.17	36.49	0.31
35	24.00	9	-0.69	0.45	10.87	0.18	61.42	0.29
35	24.00	15	-1.20	0.31	7.39	0.18	40.62	0.26
35	24.00	25	-1.90	0.26	6.29	0.19	33.63	0.30
35	24.00	36	-2.81	0.20	4.85	0.23	21.55	0.34
35	24.00	59	-4.60	0.11	2.62	0.84	3.11	1.27

Leg 1 | Operation # 912120321 | Latitude -41.99
Productivity Cast 16 | Date 7/31/1991 | Longitude -32.01

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
35	24.00	1	0.00	0.12	2.98	0.13	22.21	0.37
35	24.00	6	-0.69	0.13	3.00	0.15	20.69	0.36
35	24.00	11	-1.20	0.11	2.62	0.15	18.04	0.31
35	24.00	17	-1.90	0.11	2.57	0.12	21.76	0.35
35	24.00	26	-2.81	0.02	0.38	0.13	3.00	0.35
35	24.00	41	-4.60	0.06	1.39	0.12	11.80	0.34

Leg 2 | Operation # 912280503 | Latitude -29.84
Productivity Cast 17 | Date 8/16/1991 | Longitude -42.92

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.15	1	0.00	0.30	7.10	0.18	39.03	0.43
37	24.15	11	-0.69	0.39	9.24	0.15	61.60	0.43
37	24.15	19	-1.20	0.45	10.82	0.18	61.15	0.38
37	24.15	29	-1.90	0.37	8.78	0.17	52.92	0.39
37	24.15	43	-2.81	0.35	8.33	0.20	41.03	0.49
37	24.15	70	-4.60	0.14	3.29	0.18	18.58	0.43

NOAA South Atlantic 1991 Productivity Casts

Leg 2 | Operation # 912300569 | Latitude -24.14
Productivity Cast 18 | Date 8/18/1991 | Longitude -33.34

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.02	0.38	0.11	3.43	0.25
37	24.00	13	-0.69	0.12	2.86	0.11	25.05	0.24
37	24.00	22	-1.20	0.16	3.72	0.10	35.77	0.23
37	24.00	34	-1.90	0.13	3.17	0.11	29.06	0.23
37	24.00	51	-2.81	0.13	3.17	0.12	27.08	0.26
37	24.00	83	-4.60	0.07	1.66	0.11	15.62	0.24

Leg 2 | Operation # 912320635 | Latitude -19.00
Productivity Cast 19 | Date 8/20/1991 | Longitude -24.96

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
37	24.00	1	0.00	0.08	1.99	0.08	24.90	0.18
37	24.00	12	-0.69	0.13	3.00	0.08	38.96	0.18
37	24.00	22	-1.20	0.15	3.62	0.07	50.33	0.16
37	24.00	36	-1.90	0.16	3.72	0.08	48.31	0.17
37	24.00	53	-2.81	0.16	3.89	0.06	60.75	1.35
37	24.00	86	-4.60	0.08	1.85	0.08	24.00	1.36

Leg 2 | Operation # 912340691 | Latitude -12.82
Productivity Cast 20 | Date 8/22/1991 | Longitude -17.46

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.10	2.38	0.11	21.80	0.25
36	24.00	15	-0.69	0.14	3.38	0.08	45.12	0.21
36	24.00	32	-1.20	0.14	3.31	0.09	36.40	0.20
36	24.00	41	-1.90	0.16	3.89	0.00		0.00
36	24.00	61	-2.81	0.12	2.98	0.13	23.25	0.30
36	24.00	100	-4.60	0.07	1.61	0.12	13.18	0.31

Leg 2 | Operation # 912360722 | Latitude -5.97
Productivity Cast 21 | Date 8/24/1991 | Longitude -9.16

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.56	13.34	0.31	42.50	0.70
36	24.00	10	-0.69	0.67	15.96	0.30	53.20	0.68
36	24.00	18	-1.20	0.81	19.34	0.00		0.00
36	24.00	28	-1.90	0.66	15.79	0.00		0.00
36	24.00	41	-2.81	0.69	16.66	0.28	58.65	0.65
36	24.00	67	-4.60	0.36	8.64	0.29	29.39	0.69

NOAA South Atlantic 1991 Productivity Casts

Leg 2 | Operation # 912380760 | Latitude -2.00
Productivty Cast 22 | Date 8/26/1991 | Longitude -4.50

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.77	18.41	0.16	114.34	0.32
36	24.00	9	-0.69	0.88	21.22	0.16	131.78	0.40
36	24.00	16	-1.20	0.79	18.98	0.21	90.83	0.41
36	24.00	25	-1.90	0.58	14.02	0.19	72.62	0.40
36	24.00	37	-2.81	0.56	13.37	0.21	62.47	0.59
36	24.00	61	-4.60	0.04	0.98	0.09	10.81	0.19

Leg 2 | Operation # 912400797 | Latitude 1.64
Productivity Cast 23 | Date 8/28/1991 | Longitude -13.63

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
35	24.00	1	0.00	0.34	8.09	0.18	45.96	0.32
35	24.00	12	-0.69	0.47	11.38	0.14	79.00	0.31
35	24.00	23	-1.20	0.76	18.12	0.24	76.78	0.50
35	24.00	33	-1.90	0.86	20.54	0.15	141.68	0.32
35	24.00	49	-2.81	0.35	8.35	0.21	39.96	0.60
35	24.00	80	-4.60	0.01	0.29	0.09	3.17	0.24

Leg 2 | Operation # 912410819 | Latitude -0.11
Productivity Cast 24 | Date 8/29/1991 | Longitude -17.66

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.93	22.39	0.18	123.03	0.38
36	24.00	12	-0.69	1.05	25.22	0.18	138.59	0.36
36	24.00	20	-1.20	0.96	22.92	0.20	115.76	0.35
36	24.00	33	-1.90	1.11	26.59	0.20	134.30	0.40
36	24.00	47	-2.81	0.96	22.92	0.27	83.96	0.65
36	24.00	77	-4.60	0.44	10.63	0.29	36.79	0.80

Leg 2 | Operation # 912430853 | Latitude -3.10
Productivity Cast 25 | Date 8/31/1991 | Longitude -24.90

SALINITY	INCUB_TIME HRS	DEPTH m	OPT DEPTH	PROD_RATE (mgC/m^3/h^1)	CARB_DAY (mg/m^3)	CHLORO_A (mg/m^3)	CHLOR_DAY (mg/m^3)	TOT_PIGS (mg/m^3)
36	24.00	1	0.00	0.42	10.06	0.17	59.86	0.36
36	24.00	13	-0.69	0.51	12.26	0.16	79.12	0.29
36	24.00	22	-1.20	0.58	14.02	0.17	84.43	0.33
36	24.00	34	-1.90	0.53	12.65	0.17	76.19	0.34
36	24.00	51	-2.81	0.43	10.20	0.19	52.85	0.37
36	24.00	83	-4.60	0.09	2.26	0.14	16.23	0.43

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/11/91	17:00	-3.01	-38.07	355.24	375.19	27.35	-0.27		1012.2	355.8	14.9
7/11/91	18:00	-2.82	-37.94	355.77	382.65	27.36	-0.28		1011.8	362.4	21.1
7/11/91	19:00	-2.64	-37.80	355.69	385.75	27.44	-0.27		1011.8	365.5	24.2
7/11/91	20:00	-2.45	-37.66	356.38	384.73	27.37	-0.31		1011.9	364.0	21.7
7/11/91	21:00	-2.25	-37.52	356.86	384.69	27.10	-0.34		1012.2	363.7	20.5
7/11/91	22:00	-2.06	-37.38	355.05	381.59	27.10	-0.29		1013.0	361.9	20.2
7/11/91	23:00	-1.85	-37.25	355.09	380.65	27.05	-0.30		1013.6	361.1	19.1
7/12/91	0:00	-1.65	-37.11	354.99	380.96	27.03	-0.30		1014.2	361.7	19.6
7/12/91	1:00	-1.44	-36.98	354.96	380.76	26.90	-0.34		1014.3	360.9	18.7
7/12/91	2:00	-1.23	-36.85	354.90	382.25	26.83	-0.32		1014.4	362.8	20.6
7/12/91	3:00	-1.02	-36.72	354.88	384.44	26.84	-0.29		1013.9	365.2	23.0
7/12/91	4:00	-0.81	-36.59	354.83	384.36	26.86	-0.29	36.15	1013.2	364.7	22.8
7/12/91	5:00	-0.66	-36.51	354.83	384.66	26.86	-0.31		1012.5	364.5	22.6
7/12/91	6:00	-0.66	-36.51		386.26	26.86	-0.33		1012.4	365.7	
7/12/91	10:00	-0.66	-36.52	355.97	386.02	26.82	-0.33		1013.9	366.1	22.9
7/12/91	11:00	-0.66	-36.52	355.18	385.50	26.81	-0.33		1014.9	365.9	23.3
7/12/91	12:00	-0.66	-36.51	355.38	385.40	26.82	-0.34		1015.1	365.7	23.2
7/12/91	13:00	-0.67	-36.51	355.38	385.57	26.85	-0.34		1015.1	365.9	23.3
7/12/91	14:00	-0.60	-36.39	355.52	386.04	26.85	-0.32		1014.6	366.4	24.2
7/12/91	15:00	-0.51	-36.19	354.72	384.17	26.90	-0.24		1014.0	365.7	24.4
7/12/91	16:00	-0.49	-36.18	354.60	384.87	26.89	-0.32		1013.3	364.8	24.0
7/13/91	7:00	0.38	-34.40	354.60	385.77	26.27	-0.32		1013.0	366.0	24.1
7/13/91	8:00	0.48	-34.18	354.42	385.14	26.27	-0.25		1013.6	366.8	24.8
7/13/91	9:00	0.58	-33.97	354.40	385.05	26.31	-0.24		1013.7	367.0	25.0
7/13/91	10:00	0.70	-33.76	354.39	384.38	26.27	-0.29		1014.5	365.8	23.8
7/13/91	11:00	0.80	-33.56	354.36	384.28	26.43	-0.10		1015.0	368.9	26.9
7/13/91	19:00	1.54	-32.00	354.12	366.05	27.79	-0.17		1013.4	348.7	7.7
7/13/91	20:00	1.62	-31.81	354.24	362.65	27.78	-0.19		1013.7	345.3	3.7
7/13/91	21:00	1.71	-31.62	354.20	362.04	27.71	-0.25		1014.4	344.1	2.3
7/13/91	22:00	1.81	-31.42	354.30	362.37	27.45	-0.42		1015.3	342.2	-0.2
7/13/91	23:00	1.91	-31.23	354.42	364.98	27.11	-0.51		1015.9	343.7	0.8
7/14/91	0:00	2.02	-31.04	354.36	368.88	26.19	-0.21		1016.3	353.1	9.9
7/14/91	1:00	2.12	-30.84	354.27	383.55	26.19	-0.21		1016.5	367.1	24.2
7/14/91	2:00	2.22	-30.65	354.39	382.14	26.25	-0.22		1016.1	365.4	22.4
7/14/91	3:00	2.32	-30.45	354.52	378.65	26.31	-0.23		1015.6	361.7	18.7
7/14/91	4:00	2.43	-30.25	354.72	376.07	26.50	-0.10		1015.2	361.0	18.2
7/14/91	5:00	2.54	-30.06	354.74	374.06	26.63	-0.15		1014.8	358.1	15.4
7/14/91	6:00	2.63	-29.85	354.96	372.18	26.74	-0.15		1014.7	356.1	13.3
7/14/91	7:00	2.73	-29.65	354.92	371.23	26.84	-0.14		1015.0	355.4	12.7
7/14/91	8:00	2.82	-29.45	354.87	369.72	26.99	-0.10		1015.2	354.6	12.0
7/14/91	9:00	2.92	-29.24	354.69	367.06	27.09	-0.14		1015.7	351.5	9.1
7/14/91	10:00	2.97	-29.14	354.79	366.24	27.18	-0.16		1016.1	350.4	8.1
7/14/91	11:00	3.11	-28.82	354.80	364.46	27.23	-0.21		1016.3	348.0	5.8
7/14/91	12:00	3.21	-28.61	355.09	364.21	27.27	-0.21		1016.0	347.6	5.5
7/14/91	13:00	3.30	-28.39	355.10	364.48	27.32	-0.21		1015.7	347.7	5.8
7/14/91	14:00	3.40	-28.18	355.16	365.58	27.37	-0.21		1015.4	348.7	6.9
7/14/91	15:00	3.52	-27.97	355.07	366.69	27.41	-0.23		1015.1	349.3	7.7
7/14/91	16:00	3.63	-27.75	355.05	367.54	27.46	-0.22		1014.6	350.1	8.7
7/14/91	17:00	3.74	-27.54	355.14	368.90	27.47	-0.25		1014.2	350.6	9.4
7/14/91	18:00	3.85	-27.31	355.09	370.22	27.47	-0.26		1013.8	351.6	10.5
7/14/91	19:00	3.95	-27.09	355.10	370.52	27.47	-0.21		1014.3	352.9	11.6
7/14/91	20:00	4.06	-26.87	355.15	370.71	27.78	-0.03		1014.7	355.9	14.0
7/14/91	21:00	4.18	-26.65	355.36	363.38	27.94	-0.11		1015.0	347.5	5.2
7/14/91	22:00	4.29	-26.43	355.67	359.83	27.96	-0.19		1015.5	343.0	0.2
7/14/91	23:00	4.41	-26.20	355.88	359.61	27.92	-0.22		1016.0	342.6	-0.6
7/15/91	0:00	4.52	-25.97	355.93	359.53	27.93	-0.18		1016.4	343.3	-0.1
7/15/91	1:00	4.63	-25.73	355.56	363.73	27.96	-0.16		1016.5	347.7	4.6
7/15/91	2:00	4.73	-25.50	355.62	363.36	27.89	-0.24		1016.2	346.0	2.7
7/15/91	3:00	4.84	-25.26	355.62	356.29	27.94	-0.13		1015.5	340.6	-2.4
7/15/91	4:00	4.97	-25.04	355.68	357.53	27.84	-0.25	35.23	1014.9	339.9	-2.9
7/15/91	5:00	5.00	-24.99	355.79	350.83	27.80	-0.21		1014.7	334.1	-8.7

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/15/91	6:00	4.89	-24.97	355.78	348.94	27.79	-0.24		1014.4	331.7	-10.7
7/15/91	7:00	4.65	-24.97	355.70	349.52	27.83	-0.15		1014.7	333.7	-9.0
7/15/91	8:00	4.40	-24.98	355.49	353.95	27.87	-0.17		1014.9	337.6	-5.1
7/15/91	9:00	4.16	-24.99	355.49	360.34	27.83	-0.25		1015.4	342.7	0.2
7/15/91	10:00	4.01	-24.99	355.28	361.89	27.81	-0.24		1016.1	344.6	1.8
7/15/91	11:00	4.00	-24.99	355.15	358.17	27.82	-0.23	35.50	1016.4	341.3	-1.3
7/15/91	12:00	4.00	-24.98	355.15	358.30	27.82	-0.23		1016.2	341.3	-1.1
7/15/91	13:00	4.00	-24.97	355.01	358.02	27.81	-0.25		1016.3	340.8	-2.2
7/15/91	14:00	4.00	-24.98	355.16	358.18	27.78	-0.27		1016.1	340.5	-4.1
7/15/91	15:00	3.96	-24.97	354.70	358.09	27.77	-0.25		1015.9	340.7	-3.8
7/15/91	16:00	3.71	-24.98	354.44	357.15	27.77	-0.23		1015.4	340.0	-3.7
7/15/91	17:00	3.47	-25.00	354.84	355.97	27.58	-0.40		1015.0	336.3	-6.0
7/15/91	18:00	3.23	-25.01	354.81	360.25	27.41	-0.45		1014.9	339.6	-2.5
7/15/91	19:00	3.00	-25.00	354.89	369.17	27.30	-0.30	35.64	1014.8	350.4	7.8
7/15/91	20:00	3.00	-25.01	354.72	370.62	27.30	-0.30		1015.3	352.0	9.5
7/15/91	21:00	2.88	-25.01	354.66	370.36	27.33	-0.24		1015.5	352.8	10.6
7/15/91	22:00	2.64	-25.01	354.76	368.17	27.64	0.00		1016.1	354.5	11.9
7/15/91	23:00	2.40	-25.01	354.52	364.98	27.40	-0.42		1016.3	345.1	2.5
7/16/91	1:00	2.00	-25.01	354.50	362.35	27.78	-0.03	34.58	1016.3	348.4	5.8
7/16/91	2:00	2.00	-25.00	354.53	359.93	27.77	-0.24		1016.1	342.7	0.1
7/16/91	3:00	2.00	-25.00	354.69	359.99	27.75	-0.25		1015.3	342.4	-0.1
7/16/91	4:00	1.99	-25.00	354.59	360.20	27.77	-0.22		1014.7	342.8	0.7
7/16/91	5:00	1.86	-25.00	354.54	360.01	27.77	-0.23		1014.5	342.5	0.5
7/16/91	6:00	1.62	-25.00	354.46	357.69	27.57	-0.39		1014.8	338.1	-4.2
7/16/91	7:00	1.38	-25.01	354.59	357.39	27.00	-0.66		1015.1	334.1	-8.6
7/16/91	8:00	1.14	-25.01	354.55	359.77	26.49	-0.41		1015.3	340.6	-2.1
7/16/91	9:00	1.00	-25.00	354.52	359.99	26.23	-0.55	35.37	1015.6	338.9	-4.0
7/16/91	10:00	0.99	-25.01	354.54	364.06	26.12	-0.46		1016.1	344.4	1.3
7/16/91	11:00	0.90	-25.00	354.33	364.53	25.90	-0.49		1016.6	344.7	1.8
7/16/91	12:00	0.81	-25.00	354.40	366.09	25.88	-0.36		1017.0	348.3	5.4
7/16/91	13:00	0.61	-25.00	354.45	368.53	25.70	-0.53		1016.8	348.0	5.0
7/16/91	14:00	0.38	-25.00	354.15	370.16	25.28	-0.68		1016.5	347.4	4.9
7/16/91	15:00	0.15	-25.00	354.24	380.99	25.18	-0.39		1015.8	362.1	19.6
7/16/91	16:00	0.00	-25.00	354.19	376.99	25.12	-0.41	35.85	1015.3	357.8	15.6
7/16/91	17:00	0.00	-24.99	354.09	378.38	25.12	-0.42		1015.2	359.1	16.9
7/16/91	18:00	0.01	-24.99	354.11	377.83	25.11	-0.41		1015.1	358.6	16.1
7/16/91	19:00	0.01	-24.99	354.09	377.24	25.08	-0.42		1015.4	357.9	15.4
7/16/91	20:00	-0.15	-24.99	354.02	376.59	25.07	-0.38		1015.8	358.2	15.4
7/16/91	21:00	-0.38	-24.99	354.07	375.93	24.99	-0.41		1016.3	357.3	14.3
7/16/91	22:00	-0.61	-24.99	354.17	380.47	24.94	-0.39		1016.5	362.0	18.8
7/16/91	23:00	-0.85	-25.00	354.05	382.01	24.98	-0.28		1016.8	365.4	22.1
7/17/91	0:00	-1.00	-25.00	353.96	384.74	24.98	-0.35	36.10	1017.2	367.0	23.8
7/17/91	1:00	-1.00	-25.00	353.84	384.42	24.97	-0.39		1016.8	366.0	23.0
7/17/91	2:00	-1.00	-25.00	353.92	384.30	25.02	-0.32		1016.3	366.8	23.8
7/17/91	3:00	-1.11	-25.00	353.97	385.03	24.98	-0.40		1016.0	366.0	23.1
7/17/91	4:00	-1.33	-25.01	353.96	385.07	25.02	-0.28		1015.4	367.7	25.1
7/17/91	5:00	-1.55	-25.01	353.91	384.82	25.08	-0.31		1015.0	366.9	24.5
7/17/91	6:00	-1.77	-25.01	353.84	385.30	25.20	-0.23		1015.0	368.6	26.3
7/17/91	7:00	-2.00	-25.00	353.82	387.08	25.28	-0.27	36.08	1015.4	369.8	27.4
7/17/91	8:00	-2.00	-25.00	353.79	389.88	25.25	-0.36		1015.4	370.9	28.5
7/17/91	10:00	-2.00	-25.00	354.57	391.14	25.25	-0.37		1016.4	372.3	29.3
7/17/91	11:00	-1.99	-25.00	354.39	390.80	25.26	-0.37		1016.7	372.2	29.3
7/17/91	12:00	-1.99	-25.00	354.40	390.58	25.28	-0.37		1016.8	372.0	29.1
7/17/91	13:00	-1.97	-25.01	354.33	390.67	25.31	-0.35		1016.1	372.0	29.4
7/17/91	14:00	-2.02	-25.18	354.33	391.07	25.40	-0.34		1016.0	372.5	29.9
7/17/91	15:00	-2.07	-25.42	354.00	390.44	25.58	-0.23		1015.4	373.4	31.2
7/17/91	16:00	-2.14	-25.66	354.04	391.07	25.78	-0.20		1014.9	374.2	32.1
7/17/91	17:00	-2.20	-25.91	353.99	392.32	25.92	-0.22		1014.8	374.8	33.0
7/17/91	18:00	-2.26	-26.16	353.96	394.60	26.01	-0.28		1014.7	375.9	33.9
7/17/91	19:00	-2.32	-26.41	354.03	397.73	25.98	-0.37		1015.0	377.6	35.5
7/17/91	20:00	-2.38	-26.67	354.03	394.67	26.01	-0.27		1015.4	376.5	34.2

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/17/91	21:00	-2.43	-26.93	354.06	392.36	26.03	-0.29		1015.9	374.1	31.7
7/17/91	22:00	-2.49	-27.19	354.09	392.69	26.11	-0.25		1016.4	375.2	32.5
7/17/91	23:00	-2.55	-27.44	354.10	392.78	25.86	-0.54		1016.8	370.7	27.8
7/18/91	0:00	-2.60	-27.69	354.17	388.74	25.78	-0.38		1017.1	369.7	26.6
7/18/91	1:00	-2.66	-27.94	354.07	387.33	25.69	-0.37		1017.0	368.6	25.6
7/18/91	2:00	-2.73	-28.20	354.08	386.50	25.60	-0.36		1016.9	367.9	24.8
7/18/91	3:00	-2.79	-28.44	354.08	385.93	25.72	-0.20		1016.4	369.9	27.0
7/18/91	4:00	-2.85	-28.69	354.04	386.91	26.00	-0.03		1016.2	373.4	30.6
7/18/91	5:00	-2.92	-28.93	353.98	387.94	26.34	-0.08		1015.9	373.1	30.5
7/18/91	6:00	-2.98	-29.17	354.01	390.65	26.48	-0.16		1016.0	374.3	31.7
7/18/91	7:00	-3.04	-29.40	354.22	389.51	26.47	-0.30		1016.0	370.9	28.1
7/18/91	8:00	-3.10	-29.64	354.09	390.75	26.41	-0.37		1016.4	371.1	28.3
7/18/91	9:00	-3.15	-29.89	354.09	391.65	26.45	-0.28		1016.7	373.5	30.7
7/18/91	10:00	-3.20	-30.13	354.03	392.66	26.47	-0.28		1017.0	374.6	31.8
7/18/91	11:00	-3.26	-30.38	354.23	391.35	26.49	-0.29		1017.3	373.2	30.0
7/18/91	12:00	-3.31	-30.63	353.96	391.59	26.59	-0.21		1017.2	374.7	31.1
7/18/91	13:00	-3.37	-30.87	353.83	389.64	26.67	-0.24		1017.4	372.4	28.9
7/18/91	14:00	-3.43	-31.12	353.76	387.97	26.73	-0.26		1016.9	370.3	27.7
7/18/91	15:00	-3.48	-31.36	353.82	385.73	26.79	-0.26		1016.2	367.8	25.8
7/18/91	16:00	-3.55	-31.60	353.83	387.59	26.83	-0.29		1015.5	368.8	27.2
7/18/91	17:00	-3.62	-31.84	353.85	388.50	26.81	-0.36		1014.9	368.3	26.9
7/18/91	18:00	-3.68	-32.08	353.79	388.92	26.81	-0.34		1014.7	368.9	27.5
7/18/91	19:00	-3.74	-32.33	353.85	390.68	26.68	-0.46		1014.9	368.7	27.3
7/18/91	20:00	-3.83	-32.42	353.89	390.87	26.68	-0.35		1015.1	370.9	29.2
7/18/91	21:00	-3.82	-32.42	353.87	390.09	26.66	-0.37		1015.6	370.0	28.0
7/18/91	22:00	-3.82	-32.42	354.23	389.60	26.65	-0.35		1016.0	369.9	27.5
7/18/91	23:00	-3.76	-32.40	354.13	390.35	26.63	-0.35		1016.4	370.8	28.4
7/19/94	0:00	-3.77	-32.19	353.95	387.25	26.64	-0.31		1016.8	368.7	25.4
7/19/94	1:00	-3.77	-31.97	353.90	388.88	26.69	-0.27		1017.0	371.0	27.3
7/19/94	2:00	-3.78	-31.75	353.94	388.06	26.73	-0.26		1016.5	370.1	26.6
7/19/94	3:00	-3.78	-31.53	353.98	387.84	26.77	-0.25		1016.0	369.9	27.0
7/19/94	4:00	-3.79	-31.31	353.92	386.57	26.65	-0.41		1015.4	366.0	23.3
7/19/94	5:00	-3.79	-31.09	353.75	389.19	26.60	-0.33		1015.0	369.6	27.5
7/19/94	6:00	-3.80	-30.87	353.77	389.43	26.56	-0.33		1015.1	369.8	27.4
7/19/94	7:00	-3.81	-30.65	353.86	392.30	26.59	-0.27		1015.6	373.8	31.0
7/19/94	8:00	-3.81	-30.44	353.81	388.80	26.68	-0.21		1015.7	371.5	29.0
7/19/94	9:00	-3.81	-30.22	353.84	387.04	26.74	-0.24		1016.2	369.4	27.2
7/19/94	10:00	-3.81	-30.00	353.94	385.10	26.55	-0.46		1017.0	364.3	21.0
7/19/94	11:00	-3.81	-29.78	353.83	386.37	26.50	-0.30		1017.4	368.3	24.7
7/19/94	12:00	-3.84	-29.56	353.83	386.16	26.31	0.13		1017.6	375.6	32.4
7/19/94	13:00	-3.85	-29.35	353.77	389.87	26.37	-0.29		1017.2	371.9	29.1
7/19/94	14:00	-3.87	-29.13	353.81	391.51	26.21	-0.48		1016.7	370.2	27.6
7/19/94	15:00	-3.88	-28.91	353.81	391.47	26.09	-0.47		1016.2	370.2	27.3
7/19/94	16:00	-3.89	-28.70	354.06	390.62	25.74	-0.53		1015.4	368.4	26.2
7/19/94	17:00	-3.90	-28.49	354.12	387.66	25.80	-0.29		1015.2	369.6	27.4
7/19/94	19:00	-3.91	-28.07	354.15	388.64	25.96	-0.27		1015.7	370.8	27.8
7/19/94	20:00	-3.91	-27.85	354.14	388.56	26.04	-0.25		1016.0	371.2	27.9
7/19/94	21:00	-3.91	-27.64	354.08	387.42	26.14	-0.24		1016.1	370.2	27.1
7/19/94	22:00	-3.91	-27.42	354.12	388.89	26.15	-0.29		1016.7	371.0	27.6
7/19/94	23:00	-3.91	-27.21	354.24	391.14	26.15	-0.30		1017.0	373.1	30.1
7/20/91	0:00	-3.92	-26.99	354.26	389.52	26.16	-0.29		1017.2	371.7	28.5
7/20/91	1:00	-3.93	-26.78	354.28	387.22	26.21	-0.28		1017.0	369.6	26.7
7/20/91	2:00	-3.93	-26.56	354.28	387.26	26.25	-0.19		1016.8	371.1	27.8
7/20/91	3:00	-3.94	-26.35	354.31	385.20	26.28	-0.18		1016.2	368.9	25.5
7/20/91	4:00	-3.95	-26.13	354.25	383.93	26.30	-0.18		1015.7	367.6	24.9
7/20/91	5:00	-3.95	-25.91	354.30	384.59	26.32	-0.18		1015.5	368.2	25.6
7/20/91	6:00	-3.96	-25.70	354.32	383.31	26.28	-0.24		1015.6	366.0	23.3
7/20/91	7:00	-3.97	-25.48	354.37	375.60	26.06	-0.31		1015.8	357.8	14.9
7/20/91	8:00	-3.97	-25.27	354.38	395.55	26.04	-0.14		1016.0	379.8	36.8
7/20/91	9:00	-3.99	-25.05	354.26	404.53	26.07	0.07	35.91	1016.4	392.2	49.3
7/20/91	10:00	-4.00	-25.00	354.31	414.20	26.08	0.26		1017.1	405.2	62.4

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/20/91	11:00	-3.99	-25.00	354.16	440.25	26.10	0.53		1017.1	435.9	93.1
7/22/91	0:00	-8.19	-24.99		356.86	26.20	-0.21		1017.4	341.8	
7/22/91	1:00	-8.41	-24.99	353.63	359.98	26.03	-0.39		1017.4	342.2	-1.1
7/22/91	2:00	-8.63	-24.99	353.62	361.87	25.99	-0.42		1017.3	343.5	0.1
7/22/91	3:00	-8.85	-25.00	353.68	363.98	25.93	-0.48		1017.0	344.4	1.0
7/22/91	4:00	-9.00	-25.00	353.57	362.03	25.86	-0.56	36.53	1016.9	341.4	-1.9
7/22/91	5:00	-9.00	-25.01	353.66	362.76	25.85	-0.56		1016.7	342.0	-1.4
7/22/91	6:00	-9.21	-25.01	353.58	362.61	25.82	-0.38		1016.9	344.8	1.4
7/22/91	7:00	-9.43	-25.02	353.65	363.37	25.77	-0.37		1017.1	345.7	2.3
7/22/91	8:00	-9.66	-25.02	353.64	363.63	25.56	-0.51		1017.5	344.1	0.5
7/22/91	9:00	-9.88	-25.02	353.75	364.24	25.59	-0.28		1018.8	348.8	4.1
7/22/91	10:00	-10.10	-25.01	353.77	364.96	25.59	-0.36		1019.3	348.4	4.2
7/22/91	11:00	-10.33	-25.00	353.73	362.79	25.60	-0.34		1020.2	346.9	2.0
7/22/91	12:00	-10.54	-25.01	353.80	363.41	25.65	-0.29		1020.3	348.3	3.6
7/22/91	13:00	-10.54	-25.02	353.47	363.71	25.67	-0.37		1019.9	347.2	2.9
7/22/91	14:00	-10.68	-25.02	353.67	363.97	25.67	-0.41		1019.0	346.5	2.3
7/22/91	15:00	-10.91	-25.01	353.48	364.33	25.62	-0.41	36.84	1018.2	346.5	2.7
7/22/91	16:00	-11.00	-25.01	353.63	364.15	25.51	-0.46		1017.5	345.5	1.9
7/22/91	17:00	-11.00	-25.02	353.95	363.73	25.51	-0.41		1017.0	345.6	1.8
7/22/91	18:00	-11.00	-25.03	353.94	364.05	25.51	-0.41		1017.0	345.9	1.4
7/22/91	19:00	-11.00	-25.04	353.94	363.69	25.48	-0.43		1017.3	345.4	1.6
7/22/91	20:00	-11.01	-25.04	354.36	363.16	25.47	-0.41		1017.9	345.4	0.9
7/22/91	21:00	-11.01	-25.05	353.90	362.81	25.48	-0.39		1018.1	345.5	1.4
7/22/91	22:00	-11.17	-25.05	354.28	362.93	25.41	-0.45		1018.4	344.8	0.2
7/22/91	23:00	-11.39	-25.04	353.78	361.89	25.31	-0.45		1019.0	344.1	-0.3
7/23/91	0:00	-11.61	-25.03	354.07	363.13	25.35	-0.30		1019.3	347.6	2.9
7/23/91	1:00	-11.83	-25.02	354.02	363.08	25.28	-0.42		1019.3	345.8	1.1
7/23/91	2:00	-12.05	-25.02	354.09	362.23	25.19	-0.46		1019.2	344.4	-0.4
7/23/91	3:00	-12.28	-25.02	354.12	361.20	25.09	-0.45		1018.8	343.4	-2.1
7/23/91	4:00	-12.51	-25.01	354.13	361.01	25.10	-0.38		1018.1	344.2	-0.7
7/23/91	5:00	-12.74	-25.01	354.29	358.76	24.91	-0.55		1017.8	339.4	-5.4
7/23/91	6:00	-12.96	-25.01	354.38	359.20	24.95	-0.28	37.01	1018.2	344.1	-1.0
7/23/91	7:00	-13.00	-25.02	354.47	359.84	24.97	-0.34		1018.8	344.0	-1.9
7/23/91	8:00	-13.05	-25.02	354.47	358.84	24.97	-0.38		1019.3	342.6	-3.4
7/23/91	9:00	-13.28	-25.01	354.62	358.87	24.93	-0.41		1019.9	342.4	-3.5
7/23/91	10:00	-13.51	-25.00	354.52	357.96	25.00	-0.31		1021.1	343.5	-3.0
7/23/91	11:00	-13.74	-24.99	354.46	358.86	24.92	-0.40		1021.7	343.2	-3.3
7/23/91	12:00	-13.96	-24.99	354.48	358.92	24.84	-0.41		1021.6	343.1	-3.3
7/23/91	13:00	-13.95	-25.01	354.29	358.70	24.83	-0.43		1021.3	342.5	-3.5
7/23/91	14:00	-14.07	-25.02	354.00	358.81	24.87	-0.38		1020.6	343.2	-2.3
7/23/91	15:00	-14.29	-25.01	353.85	359.32	24.70	-0.59		1020.0	340.2	-5.0
7/23/91	16:00	-14.51	-25.00	354.01	357.73	24.47	-0.50		1019.4	340.0	-5.0
7/23/91	17:00	-14.74	-25.00	353.88	359.13	24.45	-0.42		1019.0	342.5	-2.3
7/23/91	18:00	-14.97	-25.00	353.84	359.86	24.43	-0.41	37.08	1019.3	343.4	-1.4
7/23/91	19:00	-15.00	-25.01	353.83	360.09	24.41	-0.43		1020.0	343.6	-1.6
7/23/91	20:00	-15.01	-25.02	353.87	359.59	24.40	-0.43		1020.5	343.4	-2.0
7/23/91	21:00	-15.01	-25.03	354.33	358.73	24.40	-0.41		1020.8	342.9	-3.1
7/23/91	22:00	-15.02	-25.03	354.76	358.15	24.41	-0.40		1021.6	342.8	-3.9
7/23/91	23:00	-15.02	-25.03	354.00	358.09	24.40	-0.41		1021.8	342.6	-3.5
7/24/91	0:00	-15.13	-25.04	354.00	358.01	24.36	-0.45		1021.7	342.0	-4.0
7/24/91	1:00	-15.36	-25.03	354.00	358.76	24.29	-0.41		1021.6	343.3	-2.8
7/24/91	2:00	-15.59	-25.02	353.86	358.86	24.09	-0.54		1021.4	341.4	-4.6
7/24/91	3:00	-15.82	-25.02	353.90	363.01	24.02	-0.42		1021.1	347.1	1.2
7/24/91	4:00	-16.05	-25.01	354.14	362.63	23.99	-0.38		1020.7	347.3	1.1
7/24/91	5:00	-16.28	-25.00	354.06	362.91	23.85	-0.47		1020.5	346.3	0.2
7/24/91	6:00	-16.51	-25.00	354.13	362.67	23.84	-0.38		1020.6	347.5	1.3
7/24/91	7:00	-16.74	-25.00	354.21	362.87	23.80	-0.43		1020.8	346.9	0.6
7/24/91	8:00	-16.97	-25.00	354.24	361.26	23.78	-0.38	37.17	1021.2	346.3	-0.2
7/24/91	14:00	-16.98	-24.99	355.29	365.39	23.78	-0.40		1021.7	350.1	2.7
7/24/91	15:00	-17.11	-25.00	355.48	365.98	23.77	-0.46		1020.7	349.4	2.2
7/24/91	16:00	-17.35	-24.99	354.90	365.54	23.77	-0.40		1019.9	349.6	3.1

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/24/91	17:00	-17.59	-24.98	354.85	365.53	23.65	-0.52		1019.6	347.6	1.4
7/24/91	18:00	-17.82	-24.98	354.56	365.87	23.60	-0.47		1019.9	349.0	2.9
7/24/91	19:00	-18.06	-24.98	354.60	365.66	23.45	-0.58		1020.7	347.4	0.7
7/24/91	20:00	-18.30	-24.98	354.75	365.87	23.28	-0.53		1021.3	348.6	1.3
7/24/91	21:00	-18.53	-24.98	354.55	365.29	23.14	-0.52		1021.9	348.5	1.2
7/24/91	22:00	-18.77	-24.99	354.58	366.35	23.17	-0.35		1022.6	352.5	5.0
7/24/91	23:00	-19.00	-25.00	354.55	365.54	23.18	-0.37	37.00	1023.1	351.6	3.8
7/25/91	0:00	-19.00	-25.00	354.54	363.83	23.17	-0.42		1023.4	349.3	1.3
7/25/91	6:00	-19.43	-25.01	354.80	363.54	23.03	-0.37		1022.8	349.7	1.5
7/25/91	12:00	-20.24	-25.01	354.55	360.42	22.68	-0.37		1025.5	347.8	-1.5
7/25/91	17:00	-21.35	-24.99	354.21	361.46	22.94	-0.35		1023.4	348.2	0.6
7/26/91	1:00	-22.00	-25.00	354.15	359.34	22.94	-0.37	36.98	1025.3	346.6	-1.8
7/26/91	6:00	-23.02	-25.01	354.20	351.11	22.35	-0.36		1024.9	339.0	-9.7
7/26/91	13:00	-24.02	-24.99	354.10	350.05	22.07	-0.30		1027.1	339.7	-8.7
7/26/91	18:00	-25.21	-25.00	353.81	341.03	21.56	-0.57	36.71	1026.1	326.9	-21.4
7/27/91	0:00	-26.00	-24.99	353.85	337.46	21.22	-0.37		1028.0	327.3	-22.3
7/27/91	6:00	-26.89	-25.00	353.65	340.81	21.04	-0.30		1028.2	331.7	-18.6
7/27/91	12:00	-27.57	-25.86	354.05	332.33	20.87	-0.33		1032.5	324.5	-27.6
7/27/91	18:00	-28.17	-26.72	353.62	332.53	21.05	-0.31		1031.7	324.6	-27.1
7/28/91	0:00	-29.08	-27.90	353.56	328.29	20.94	-0.35		1034.1	320.7	-32.2
7/28/91	6:24	-29.50	-28.50	353.73	326.84	20.39	-0.32	36.18	1033.5	319.7	-33.3
7/28/91	11:00	-30.18	-29.43	353.92	327.81	19.85	-0.43		1035.4	320.0	-33.8
7/28/91	12:00	-30.31	-29.63	354.16	327.45	19.64	-0.04		1035.6	325.4	-28.8
7/28/91	13:00	-30.31	-29.64	354.21	327.16	19.65	-0.32		1034.9	320.8	-32.7
7/28/91	14:00	-30.46	-29.85	354.21	327.07	19.75	-0.20		1034.3	322.3	-31.1
7/28/91	15:00	-30.61	-30.06	354.08	327.87	19.60			1033.7	325.7	
7/28/91	17:00	-30.93	-30.49	354.16	327.39	19.25	-0.47		1033.8	318.7	-34.7
7/28/91	18:00	-31.08	-30.70	354.13	325.76	19.25	-0.27		1034.0	320.2	-33.3
7/28/91	19:00	-31.24	-30.92	354.17	324.82	19.15	-0.33		1033.9	318.3	-35.1
7/28/91	20:00	-31.40	-31.13	354.19	323.97	19.21	-0.17		1034.1	319.8	-33.8
7/28/91	21:00	-31.56	-31.35	354.15	323.94	19.37	-0.09		1034.1	320.9	-32.6
7/28/91	22:00	-31.72	-31.56	354.12	323.52	19.26	-0.38		1034.0	316.3	-37.2
7/28/91	23:00	-31.87	-31.78	354.16	322.93	19.11	-0.44		1034.0	315.0	-38.3
7/29/91	0:00	-32.00	-31.99	354.17	321.95	19.01	-0.37	35.88	1033.9	315.0	-38.2
7/29/91	1:00	-31.99	-31.99	354.16	322.02	18.78	-0.34		1033.4	315.4	-37.8
7/29/91	2:00	-31.99	-31.98	354.14	321.68	18.77	-0.30		1033.3	315.7	-37.4
7/29/91	3:00	-31.99	-31.96	354.14	321.54	18.79	-0.26		1032.7	315.8	-37.1
7/29/91	4:00	-32.06	-31.95	354.27	321.90	18.98	-0.13		1031.8	317.7	-34.9
7/29/91	5:00	-32.30	-31.96	354.20	322.34	18.70	-0.61		1031.6	311.4	-41.1
7/29/91	6:00	-32.54	-31.97	354.11	320.56	18.01	-0.36		1031.5	313.4	-39.0
7/29/91	7:00	-32.78	-31.98	354.08	319.70	17.66	-0.46		1031.6	311.4	-41.0
7/29/91	8:00	-33.01	-31.98	354.09	318.98	17.06	-0.82		1031.6	305.9	-46.7
7/29/91	9:00	-33.24	-31.99	354.07	319.37	16.70	-0.32		1031.7	313.4	-39.1
7/29/91	10:00	-33.48	-32.01	354.04	320.44	16.65	-0.31		1031.4	314.6	-37.8
7/29/91	11:00	-33.72	-32.01	353.96	320.05	16.65	-0.18		1031.4	315.9	-36.3
7/29/91	12:00	-33.95	-32.00	354.05	320.69	16.59	-0.28		1031.5	315.3	-37.1
7/29/91	13:00	-34.00	-32.00	353.86	319.83	16.43	-0.26	35.47	1031.2	314.5	-37.5
7/29/91	14:00	-34.00	-32.00	353.72	318.39	16.44	-0.26		1030.6	313.0	-38.7
7/29/91	15:00	-34.00	-31.99	353.88	318.61	16.46	-0.24		1029.9	313.2	-38.4
7/29/91	16:00	-34.17	-32.00	353.99	318.93	16.48	-0.24		1029.5	313.4	-38.1
7/29/91	17:00	-34.40	-32.00	353.96	319.25	16.39	-0.34		1029.1	312.2	-39.3
7/29/91	18:00	-34.64	-32.00	353.83	318.58	16.52	-0.07		1028.7	315.2	-36.0
7/29/91	19:00	-34.88	-31.99	353.98	319.82	16.49	-0.27		1028.5	313.6	-38.0
7/29/91	20:00	-35.12	-31.99	353.89	319.10	16.02	-0.73		1028.0	306.5	-44.8
7/29/91	21:00	-35.35	-31.99	353.86	319.18	15.71	-0.44		1027.7	310.6	-40.5
7/29/91	22:00	-35.59	-32.00	353.78	318.34	15.52	-0.76		1027.3	305.3	-45.7
7/29/91	23:00	-35.82	-32.01	353.75	318.77	15.43	-0.27	35.45	1026.6	312.3	-38.6
7/30/91	0:00	-36.00	-32.00	353.80	318.82	15.50	-0.16		1026.5	313.8	-37.0
7/30/91	1:00	-36.01	-32.00	353.96	319.40	15.60	-0.24		1026.4	313.2	-37.8
7/30/91	2:00	-36.02	-32.01	353.51	317.95	15.60	-0.25		1026.5	311.7	-38.9
7/30/91	3:00	-36.02	-32.01	353.71	317.92	15.60	-0.25		1026.3	311.6	-39.0

NOAA South Atlantic 1991 Underway Values

Leg 1 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(CTD)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
7/30/91	6:00	-36.58	-32.00	353.89	318.89	15.47	-0.07		1024.2	314.5	-35.8
7/30/91	7:00	-36.82	-32.00	354.07	319.64	15.37	-0.29		1023.8	312.0	-38.2
7/30/91	8:00	-37.05	-32.00	353.96	320.35	15.37	-0.12		1023.3	315.0	-34.9
7/30/91	9:00	-37.28	-32.00	354.06	320.84	15.14	-0.29		1022.9	313.0	-36.8
7/30/91	10:00	-37.52	-32.00	353.87	322.08	15.12	-0.24		1022.5	314.8	-34.7
7/30/91	11:00	-37.75	-32.00	353.78	320.52	15.10	-0.23		1022.3	313.4	-36.0
7/30/91	12:00	-37.98	-32.00	353.73	321.11	15.02	-0.27		1022.4	313.5	-35.9
7/30/91	13:00	-38.01	-32.00	353.73	321.17	15.00	-0.24	35.37	1022.0	313.9	-35.4
7/30/91	14:00	-38.03	-31.99	353.70	321.65	15.00	-0.28		1021.1	313.5	-35.4
7/30/91	15:00	-38.03	-31.98		321.93	15.01	-0.25		1020.9	314.1	
7/30/91	16:00	-38.15	-31.96		322.63	14.92	-0.35		1019.8	313.0	
7/30/91	17:00	-38.39	-31.97	354.68	322.46	14.68	-0.42		1019.5	311.9	-37.4
7/30/91	18:00	-38.62	-31.98	353.63	322.59	14.85	-0.21		1019.0	314.8	-33.4
7/30/91	19:00	-38.86	-31.98	353.55	322.71	14.99	-0.10		1018.5	316.2	-31.7
7/30/91	20:00	-39.09	-31.98	353.60	323.42	14.95	-0.24		1017.7	314.7	-33.0
7/30/91	21:00	-39.33	-31.98	353.60	321.62	14.96	-0.20		1016.6	313.2	-34.2
7/30/91	22:00	-39.57	-31.98	353.75	321.55	15.11	-0.07		1015.6	314.5	-32.6
7/30/91	23:00	-39.81	-31.98	353.66	323.47	14.86	-0.46		1014.7	310.8	-35.9
7/31/91	0:00	-40.00	-32.00	353.73	325.77	13.75	-0.55	35.18	1014.6	312.0	-35.0
7/31/91	1:00	-40.02	-31.99	353.75	325.22	14.47	-0.24		1014.0	315.5	-31.2
7/31/91	2:00	-40.03	-31.99	353.55	327.53	14.51	-0.20		1013.5	318.1	-28.2
7/31/91	3:00	-40.04	-31.98	353.68	328.25	14.30	-0.47		1013.2	314.9	-31.4
7/31/91	4:00	-40.11	-31.98	353.72	327.54	14.04	-0.52		1011.9	313.1	-32.8
7/31/91	5:00	-40.35	-31.98	353.76	328.23	12.72	-0.47		1009.6	314.2	-31.5
7/31/91	6:00	-40.58	-31.99	353.69	326.44	12.46	-0.23		1008.6	315.6	-29.8
7/31/91	7:00	-40.82	-32.01	353.58	324.39	12.20	-0.33		1007.6	312.0	-33.0
7/31/91	8:00	-41.04	-32.02	353.62	326.58	12.13	-0.57		1006.8	310.6	-34.1
7/31/91	9:00	-41.28	-32.04	353.68	335.18	12.34	-0.05		1005.6	325.8	-18.7
7/31/91	10:00	-41.51	-32.03	353.73	330.89	12.20	-0.64		1004.8	313.1	-31.0
7/31/91	11:00	-41.74	-32.01	353.69	333.45	11.41	-0.97		1004.9	310.9	-33.3
7/31/91	12:00	-41.97	-32.00	353.80	341.74	12.18	-0.20		1005.9	330.0	-14.7
7/31/91	13:00	-42.00	-32.01	353.91	345.02	12.12	-0.51	35.07	1006.1	328.8	-16.0
7/31/91	14:00	-42.01	-32.02	354.03	344.61	12.08	-0.54		1006.1	327.9	-17.1
7/31/91	15:00	-42.02	-32.03	354.36	344.32	12.06	-0.52		1006.6	328.0	-17.6
7/31/91	16:00	-42.03	-32.03	354.51	344.20	12.06	-0.50		1007.3	328.5	-17.5
7/31/91	17:00	-42.03	-32.04	354.69	344.39	12.04	-0.51		1007.9	328.7	-17.6
7/31/91	18:00	-42.03	-32.05	354.71	343.83	12.07	-0.46		1009.3	329.4	-17.5
7/31/91	22:00	-41.90	-32.75	353.98	357.98	11.37	-0.64		1012.5	341.5	-6.1
7/31/91	23:00	-41.86	-32.93	354.04	339.49	11.97	-0.05		1013.1	332.6	-15.3
8/1/91	0:00	-41.82	-33.12	354.14	329.51	12.14	-0.49		1013.1	316.5	-31.3
8/1/91	1:00	-41.79	-33.30	354.05	326.63	11.87	-0.73		1013.4	310.5	-37.3
8/1/91	2:00	-41.76	-33.48	354.07	327.29	11.68	-0.77		1013.0	310.4	-37.3
8/1/91	3:00	-41.73	-33.66	354.01	326.74	11.47	-0.76		1013.0	310.2	-37.4
8/1/91	4:00	-41.70	-33.85	353.96	326.45	12.15	-0.23		1012.5	316.9	-30.5
8/1/91	5:00	-41.67	-34.03	354.02	324.85	12.14	-0.51		1012.2	311.3	-36.1
8/1/91	6:00	-41.63	-34.22	353.98	324.96	11.75	-0.56		1011.7	310.7	-36.5
8/1/91	7:00	-41.58	-34.44	353.85	325.77	11.11	-0.74		1011.3	309.0	-37.9
8/1/91	8:00	-41.53	-34.69	353.89	328.82	11.39	-0.46		1011.1	315.7	-31.1
8/1/91	9:00	-41.49	-34.94	353.81	326.08	11.42	-0.70		1011.0	309.8	-37.0
8/1/91	10:00	-41.44	-35.19	353.76	324.97	10.95	-0.84		1010.4	306.7	-39.8
8/1/91	11:00	-41.40	-35.43	353.79	328.21	11.41	-0.38		1009.1	315.6	-30.4
8/1/91	12:00	-41.36	-35.68	353.76	324.96	11.61	-0.47		1008.3	310.9	-34.7
8/1/91	13:00	-41.33	-35.93	353.78	326.06	12.13	-0.17		1007.2	315.7	-29.5
8/1/91	14:00	-41.29	-36.18	353.84	324.59	11.65	-0.69		1005.3	306.7	-38.0
8/1/91	14:54	-41.25	-36.44	353.83	325.08	11.81			1003.3		
8/1/91	16:00	-39.96	-41.65	353.69	326.91	15.43			1002.3	316.8	-27.5

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/14/91	00:00			353.18	284.46	10.33	-0.49		1026.1	277.1	-74.4
8/14/91	01:00			353.90	325.96	10.40	-0.33		1026.1	319.9	-32.4
8/14/91	02:00			353.88	263.26	10.51	-0.53		1026.1	255.9	-96.2
8/14/91	03:00	-34.63	-53.57	354.75	222.69	10.68	-0.34		1026.1	218.4	-134.6
8/14/91	04:00	-34.56	-53.45	355.23	272.76	10.65	-0.32		1026.1	267.7	-85.8
8/14/91	05:00	-34.50	-53.33	353.95	311.56	10.57	-0.37		1026.5	305.3	-47.1
8/14/91	06:00	-34.44	-53.21	352.81	340.61	10.55	-0.24		1026.0	335.5	-15.7
8/14/91	07:00	-34.38	-53.09	352.80	342.87	10.50	-0.35		1025.9	336.0	-15.1
8/14/91	08:00	-34.33	-52.97	353.25	293.77	10.48	-0.22		1025.9	289.6	-62.0
8/14/91	09:00	-34.28	-52.85	354.31	305.76	10.92	-0.34		1025.9	299.7	-52.8
8/14/91	10:00	-34.26	-52.72	354.39	308.70	11.07	-0.38		1026.2	302.0	-50.5
8/14/91	11:00	-34.20	-52.61	354.04	299.09	11.14	-0.37		1026.2	292.9	-59.3
8/14/91	12:00	-34.14	-52.41	354.15	292.94	11.33	-0.21		1026.2	288.7	-63.6
8/14/91	13:00	-34.12	-52.16	353.15	301.26	11.11	-0.48		1027.8	294.0	-57.8
8/14/91	14:00	-34.10	-51.92	353.04	288.26	12.09	-0.54		1027.8	280.3	-71.1
8/14/91	15:00	-34.08	-51.68	353.23	313.55	14.74	-0.46		1027.8	305.3	-45.5
8/14/91	16:00	-34.00	-51.46	353.20	321.73	14.46	*0.22*	34.01	1027.6	322.7	-28.3
8/14/91	17:00	-33.93	-51.31	353.16	323.71	13.40	-0.38		1027.6	316.6	-34.5
8/14/91	18:00	-33.85	-51.15	353.25	323.60	13.06	-0.71		1027.2	311.7	-39.3
8/14/91	19:00	-33.74	-50.94	353.40	324.42	16.72	-0.39	34.51	1027.2	315.9	-34.1
8/14/91	20:00	-33.61	-50.74	353.50	323.63	16.37	-0.73		1027.2	310.4	-39.7
8/14/91	21:00	-33.50	-50.53	353.49	310.66	17.60	-0.23		1027.7	304.5	-45.5
8/14/91	22:00	-33.39	-50.33	353.56	309.94	17.94	-0.48	34.38	1027.7	300.3	-49.5
8/14/91	23:00	-33.28	-50.12	353.49	325.90	19.46	-0.25		1029.3	319.0	-30.7
8/15/91	00:00	-33.17	-49.92	353.48	324.30	19.42	-0.48		1029.5	314.2	-35.5
8/15/91	01:00	-33.07	-49.71	353.50	322.72	19.38	-0.44	36.25	1030.2	313.5	-36.5
8/15/91	02:00	-32.97	-49.51	353.60	327.87	20.35	-0.77		1030.2	313.2	-36.2
8/15/91	03:00	-32.87	-49.32	353.61	328.27	21.13	-0.33		1030.2	319.6	-29.6
8/15/91	04:00	-32.78	-49.14	353.63	328.69	21.20	-0.38	36.49	1030.2	319.3	-29.9
8/15/91	05:00	-32.68	-48.98	353.61	331.09	21.34	-0.41		1031.2	321.5	-28.0
8/15/91	06:00	-32.60	-48.85	353.53	327.99	20.62	0.00		1031.2	324.6	-25.3
8/15/91	07:00	-32.53	-48.72	353.51	325.08	21.03	-0.14	36.57	1031.2	319.6	-30.1
8/15/91	08:00	-32.48	-48.61	353.51	329.67	20.38	-0.43		1031.2	320.2	-29.6
8/15/91	09:00	-32.41	-48.50	353.39	325.92	20.11	-0.22		1031.2	319.7	-30.2
8/15/91	10:00	-32.34	-48.37	353.38	322.59	19.59	-0.31	36.23	1031.2	315.4	-34.7
8/15/91	11:00	-32.26	-48.25	353.54	321.21	19.43	-0.47		1031.2	311.9	-38.4
8/15/91	12:00	-32.16	-48.10	353.51	320.01	19.46	-0.17		1031.2	314.8	-35.6
8/15/91	13:00	-32.07	-47.94	353.52	319.70	18.57	-0.31	36.08	1031.2	312.9	-37.8
8/15/91	14:00	-31.97	-47.77	353.56	318.41	18.82	-0.51		1031.2	308.8	-41.8
8/15/91	15:00	-31.87	-47.60	353.52	319.79	18.91	-0.53	36.12	1031.2	309.8	-40.7
8/15/91	16:00	-31.77	-47.44	353.44	320.39	19.02	-0.75	36.18	1031.2	307.2	-43.0
8/15/91	17:00	-31.68	-47.28	353.45	318.98	19.12	-0.61		1031.2	307.9	-42.4
8/15/91	18:00	-31.60	-47.12	353.49	319.24	19.20	-0.53	36.17	1033.8	310.0	-41.3
8/15/91	19:00	-31.52	-46.97	353.55	312.81	18.83	-0.50	36.17	1033.8	304.3	-47.2
8/15/91	20:00	-31.44	-46.80	353.54	314.71	18.99	-0.46		1033.8	306.7	-44.8
8/15/91	21:00	-31.38	-46.56	353.55	316.66	17.73	-0.31	35.90	1033.8	311.1	-41.0
8/15/91	22:00	-31.32	-46.30	353.59	316.12	19.08	-0.70	36.20	1033.8	304.6	-46.7
8/15/91	23:00	-31.25	-46.06	353.62	319.78	19.41	-0.45		1033.8	311.6	-39.8
8/16/91	00:00	-31.16	-45.82	353.60	320.19	19.53	-0.42	36.31	1033.8	312.3	-38.9
8/16/91	01:00	-31.06	-45.58	353.60	317.66	19.34	-0.19	36.20	1033.8	313.2	-38.2
8/16/91	02:00	-30.97	-45.34	353.62	322.91	19.72	-0.39		1033.8	315.4	-35.8
8/16/91	03:00	-30.87	-45.10	353.54	322.37	19.75	-0.32	36.37	1033.8	315.8	-35.3
8/16/91	04:00	-30.77	-44.87	353.61	322.10	19.52	-0.38	36.24	1033.8	314.7	-36.6
8/16/91	05:00	-30.68	-44.62	353.59	322.75	19.54	-0.37		1033.8	315.5	-35.7
8/16/91	06:00	-30.58	-44.37	353.62	323.15	19.57	-0.48	36.26	1033.8	314.4	-36.8
8/16/91	07:00	-30.50	-44.11	353.57	323.06	19.58	-0.33	36.27	1033.8	316.3	-34.9
8/16/91	08:00	-30.39	-43.87	353.59	322.28	19.54	-0.37		1033.8	315.1	-36.1
8/16/91	09:00	-30.27	-43.64	353.64	321.40	19.79	-0.55	36.20	1033.8	311.5	-39.6
8/16/91	10:00	-30.14	-43.42	353.61	318.82	19.33	-0.25	36.07	1033.8	313.5	-38.0
8/16/91	11:00	-30.01	-43.20	353.57	320.27	19.71	-0.37		1038.1	314.4	-38.2
8/16/91	12:00	-29.88	-42.98	353.58	322.79	19.99	-0.46	36.24	1038.1	315.4	-37.1

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/16/91	13:00	-29.84	-42.92	353.52	322.76	20.78	-0.44	36.48	1038.1	315.3	-36.7
8/16/91	14:00	-29.81	-42.89	353.47	323.94	20.81	-0.39		1038.7	317.4	-34.9
8/16/91	15:00	-29.68	-42.67	353.29	323.76	20.64	-0.61	36.43	1038.7	314.2	-37.8
8/16/91	16:00	-29.55	-42.46	353.49	322.54	20.51	-0.51	36.43	1038.7	314.4	-37.9
8/16/91	17:00	-29.43	-42.25	353.44	323.73	20.37	-0.31		1037.2	318.0	-33.9
8/16/91	18:00	-29.31	-42.03	353.54	322.64	20.86	-0.31	36.35	1037.2	316.7	-35.1
8/16/91	19:00	-29.18	-41.80	353.55	325.11	21.44	-0.50		1037.2	316.2	-35.2
8/16/91	20:00	-29.05	-41.58	353.59	323.80	21.28	-0.30		1036.9	317.8	-33.7
8/16/91	21:00	-28.91	-41.36	353.63	320.99	20.23	0.00	36.26	1036.9	319.8	-32.5
8/16/91	22:00	-28.77	-41.14	353.59	318.71	19.82	-0.17	36.06	1036.9	315.2	-37.1
8/16/91	23:00	-28.64	-40.92	353.59	317.53	19.65	-0.82		1037.6	305.2	-47.1
8/17/91	00:00	-28.51	-40.70	353.54	320.47	20.01	-0.05	36.06	1037.6	318.8	-33.7
8/17/91	01:00	-28.38	-40.47	353.61	323.07	21.01	-0.61	36.60	1037.6	313.0	-38.8
8/17/91	02:00	-28.26	-40.25	353.67	325.66	21.10	-0.37	36.58	1037.6	318.9	-33.0
8/17/91	03:00	-28.14	-40.03	353.71	324.56	20.89	-0.43	36.49	1037.6	317.0	-35.0
8/17/91	04:00	-28.02	-39.81	353.73	327.03	20.90	-0.37	36.47	1037.6	320.3	-31.8
8/17/91	05:00	-27.90	-39.59	353.49	325.76	20.94	-0.40	36.47	1037.6	318.6	-33.2
8/17/91	06:00	-27.78	-39.37	353.47	326.55	20.85	-0.41	36.45	1037.6	319.2	-32.6
8/17/91	07:00	-27.66	-39.16	353.50	325.71	21.04	-0.33	36.48	1037.6	319.5	-32.3
8/17/91	08:00	-27.54	-38.94	353.52	324.29	21.04	-0.37	36.45	1037.6	317.6	-34.2
8/17/91	09:00	-27.42	-38.72	353.54	324.61	21.10	-0.30	36.47	1037.6	318.9	-32.9
8/17/91	10:00	-27.29	-38.51	353.60	323.72	21.23	-0.42	36.50	1037.6	316.2	-35.5
8/17/91	11:00	-27.17	-38.30	353.53	324.90	21.36	-0.44	36.51	1036.6	316.7	-34.6
8/17/91	12:00	-27.03	-38.08	353.54	325.37	21.40	-0.38	36.52	1036.6	318.0	-33.2
8/17/91	13:00	-26.90	-37.87	353.52	325.13	21.28	-0.40	36.49	1036.6	317.5	-33.8
8/17/91	14:00	-26.77	-37.65	353.49	324.58	21.22	-0.39	36.51	1037.0	317.3	-34.1
8/17/91	15:00	-26.64	-37.43	353.49	325.57	21.34	-0.36	36.49	1037.0	318.7	-32.7
8/17/91	16:00	-26.51	-37.21	353.47	326.06	21.40	-0.65	36.52	1037.0	314.9	-36.3
8/17/91	17:00	-26.38	-36.99	353.45	330.42	22.08	-0.14	36.70	1037.0	326.2	-24.8
8/17/91	18:00	-26.25	-36.78	353.42	327.50	21.60	-0.66	36.62	1037.0	316.0	-35.0
8/17/91	19:00	-26.12	-36.57	353.46	333.80	22.04	-0.34	36.74	1037.0	326.7	-24.3
8/17/91	20:00	-26.01	-36.38	353.48	335.80	21.93	-0.50	36.76	1034.5	325.5	-24.6
8/17/91	21:00	-25.88	-36.17	353.47	335.06	21.93	-0.45	36.73	1034.5	325.5	-24.6
8/17/91	22:00	-25.75	-35.96	353.51	335.18	22.01	-0.39	36.76	1034.5	326.4	-23.7
8/17/91	23:00	-25.62	-35.75	353.45	335.05	21.95	-0.40	36.75	1034.5	326.2	-23.9
8/18/91	00:00	-25.48	-35.55	353.41	334.58	21.90	-0.33	36.72	1034.5	326.7	-23.4
8/18/91	01:00	-25.35	-35.35	353.45	333.50	21.81	-0.38	36.72	1034.5	325.0	-25.2
8/18/91	02:00	-25.22	-35.15	353.47	330.34	21.55	-0.40	36.61	1034.5	321.8	-28.6
8/18/91	03:00	-25.10	-34.94	353.47	336.47	22.00	-0.51	36.75	1034.5	325.9	-24.2
8/18/91	04:00	-24.98	-34.73	353.50	340.88	22.22	-0.20	36.74	1034.5	334.7	-15.4
8/18/91	05:00	-24.87	-34.52	353.50	340.32	21.95	-0.28	36.68	1034.5	333.2	-17.1
8/18/91	06:00	-24.75	-34.31	353.49	340.56	21.68	-0.41	36.63	1034.5	331.5	-18.8
8/18/91	07:00	-24.63	-34.10	353.47	340.28	21.67	-0.41	36.62	1034.5	331.3	-19.0
8/18/91	08:00	-24.51	-33.89	353.48	339.19	21.67	-0.32	36.63	1034.5	331.6	-18.7
8/18/91	09:00	-24.38	-33.69	353.51	340.58	22.19	-0.33	36.84	1034.5	332.5	-17.6
8/18/91	10:00	-24.25	-33.49	353.50	340.69	21.82	-0.78	36.81	1032.1	325.3	-23.9
8/18/91	11:00	-24.15	-33.34	353.54	340.48	22.03	-0.56	36.83	1032.1	328.2	-21.0
8/18/91	12:00	-24.14	-33.35	353.58	340.59	22.09	-0.47	36.80	1032.1	329.7	-19.6
8/18/91	13:00	-24.13	-33.37		340.81	21.93	-0.44	36.72	1032.1	330.3	-20.0
8/18/91	14:00	-24.13	-33.37		341.66	21.84	-0.49	36.69	1033.4	330.9	-19.1
8/18/91	15:00	-24.13	-33.38		342.19	21.79	-0.51	36.67	1032.5	330.8	-19.2
8/18/91	16:00	-24.11	-33.37		342.48	21.84	-0.59	36.66	1032.5	329.9	-20.1
8/18/91	17:00	-23.99	-33.17	353.39	341.13	22.02	-0.45	36.76	1032.5	330.7	-18.6
8/18/91	18:00	-23.86	-32.97	353.48	338.55	21.85	-0.40	36.73	1032.5	329.0	-20.6
8/18/91	19:00	-23.74	-32.77	353.51	333.59	21.58	-0.55	36.66	1031.3	321.7	-27.5
8/18/91	20:00	-23.65	-32.61	353.86	331.56	21.62	-0.18	36.58	1031.5	325.2	-24.5
8/18/91	21:00	-23.55	-32.43	354.12	337.34	21.62	-0.57	36.71	1031.4	325.0	-24.8
8/18/91	22:00	-23.45	-32.23	354.16	340.41	21.62	-0.57	36.81	1031.4	328.0	-21.9
8/18/91	23:00	-23.34	-32.02	354.07	344.80	22.22	-0.53	36.85	1031.8	332.7	-16.9
8/19/91	00:00	-23.23	-31.81	354.11	347.46	22.45	-0.32		1031.8	338.3	-11.3
8/19/91	01:00	-23.11	-31.61	354.16	347.07	22.22	-0.36	36.78	1031.6	337.3	-12.4

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Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/19/91	02:00	-22.99	-31.41	353.93	345.90	22.64	-0.41	36.97	1031.4	335.3	-13.9
8/19/91	03:00	-22.87	-31.21	353.89	347.51	22.56	-0.51	36.96	1031.8	335.4	-13.8
8/19/91	04:00	-22.75	-31.01	353.89	347.96	22.31	-0.32	36.79	1030.3	338.4	-10.6
8/19/91	05:00	-22.62	-30.81	354.11	347.90	22.36	-0.48	36.86	1030.3	335.8	-13.2
8/19/91	06:00	-22.49	-30.61	353.92	349.08	22.48	-0.25	36.85	1029.7	340.2	-8.5
8/19/91	07:00	-22.36	-30.41	353.87	348.31	22.39	-0.29	36.82	1029.5	338.8	-9.8
8/19/91	08:00	-22.23	-30.21	353.83	347.99	22.26	-0.45	36.79	1029.8	336.2	-12.4
8/19/91	09:00	-22.13	-30.06	353.98	347.26	22.33	-0.39	36.89	1030.4	336.6	-12.4
8/19/91	10:00	-22.01	-29.86	353.92	348.73	22.29	-0.40	36.87	1029.8	337.8	-11.0
8/19/91	11:00	-21.89	-29.66	353.90	347.17	22.21	-0.37	36.88	1029.8	336.7	-12.1
8/19/91	12:00	-21.76	-29.46	353.97	346.45	22.22	-0.40	36.85	1030.5	335.9	-13.2
8/19/91	13:00	-21.64	-29.26	354.07	347.57	22.33	-0.42	36.85	1030.5	336.5	-12.6
8/19/91	14:00	-21.52	-29.06	353.95	347.63	22.04	-0.46	36.77	1030.5	336.1	-13.0
8/19/91	15:00	-21.40	-28.86	353.95	348.81	22.12	-0.42	36.74	1030.5	337.9	-11.3
8/19/91	16:00	-21.28	-28.65	353.54	347.38	22.11	-0.51	36.76	1028.2	334.3	-13.6
8/19/91	17:00	-21.16	-28.46	353.58	350.16	22.21	-0.40	36.75	1028.2	338.6	-9.3
8/19/91	18:00	-21.05	-28.26	353.65	351.01	22.42	-0.77	36.77	1027.7	333.5	-14.0
8/19/91	19:00	-20.93	-28.06	353.63	352.79	22.71	-0.49	36.98	1027.9	339.4	-8.2
8/19/91	20:00	-20.83	-27.91	353.69	353.22	22.76	-0.37	36.97	1027.9	341.7	-5.9
8/19/91	21:00	-20.71	-27.72	353.66	351.72	22.47	-0.30	36.86	1027.9	341.5	-6.3
8/19/91	22:00	-20.58	-27.52	353.70	351.53	22.38	-0.45	36.82	1027.9	339.0	-8.8
8/19/91	23:00	-20.45	-27.33	353.68	352.13	22.38	-0.42	36.83	1027.9	340.0	-7.8
8/20/91	00:00	-20.33	-27.14	353.69	356.80	22.46	-0.39		1028.6	345.2	-2.9
8/20/91	01:00	-20.20	-26.94	353.69	356.44	22.39	-0.39	36.83	1028.0	344.7	-3.2
8/20/91	02:00	-20.08	-26.74	353.66	355.95	22.18	-0.42	36.76	1028.6	344.0	-4.1
8/20/91	03:00	-19.95	-26.55	353.70	354.06	22.10	-0.43	36.73	1028.6	342.2	-6.1
8/20/91	04:00	-19.83	-26.36	353.71	354.43	22.07	-0.41	36.69	1026.2	342.0	-5.5
8/20/91	05:00	-19.71	-26.16	353.71	355.53	22.21	-0.51	36.77	1026.2	341.4	-5.9
8/20/91	06:00	-19.60	-25.97	353.72	358.33	22.43	-0.44	36.84	1026.2	345.2	-2.1
8/20/91	07:00	-19.49	-25.77	353.72	359.19	22.47	-0.42	36.84	1026.2	346.2	-1.0
8/20/91	08:00	-19.40	-25.60	353.77	358.87	22.56	-0.44	36.85	1026.1	345.5	-1.7
8/20/91	09:00	-19.31	-25.43	353.72	360.85	22.59	-0.41	36.83	1026.1	347.9	0.8
8/20/91	10:00	-19.18	-25.24	353.80	361.16	22.62	-0.46	36.86	1026.6	347.6	0.2
8/20/91	11:00	-19.06	-25.05	353.73	361.04	22.60	-0.42	36.83	1026.1	347.8	0.8
8/20/91	12:00	-19.00	-24.99	353.75	361.09	22.69	-0.47	36.88	1026.1	347.1	0.0
8/20/91	13:00	-19.01	-25.00	354.07	361.79	22.71	-0.50		1026.1	347.2	-0.1
8/20/91	14:00	-19.01	-25.01		362.39	22.73	-0.53	36.88	1025.8	347.2	0.2
8/20/91	15:00	-18.99	-24.99		362.64	22.72	-0.46	36.88	1026.1	348.7	1.7
8/20/91	16:00	-18.84	-24.82	353.60	361.92	22.66	-0.54		1024.0	346.0	-0.1
8/20/91	17:00	-18.70	-24.64	353.72	362.22	22.46	-0.45	36.77	1024.0	347.9	1.5
8/20/91	18:00	-18.56	-24.46	353.64	362.08	22.72	-0.39	36.86	1024.0	348.6	2.4
8/20/91	19:00	-18.43	-24.27	353.64	361.05	22.89	-0.46		1024.0	346.3	0.2
8/20/91	20:00	-18.30	-24.10	353.67	362.05	22.72	-0.42	36.88	1024.2	348.2	1.8
8/20/91	21:00	-18.16	-23.92	353.65	361.82	22.70	-0.44	36.89	1024.1	347.5	1.3
8/20/91	22:00	-18.02	-23.74	353.65	361.83	22.90	-0.43		1024.1	347.6	1.4
8/20/91	23:00	-17.88	-23.55	353.63	362.76	22.82	-0.42	36.91	1024.1	348.7	2.5
8/21/91	00:00	-17.73	-23.38	353.63	362.85	22.82	-0.45		1024.8	348.6	2.2
8/21/91	01:00	-17.58	-23.20	353.42	362.85	22.74	-0.45		1024.7	348.6	2.4
8/21/91	02:00	-17.43	-23.03	353.65	363.63	22.73	-0.37	36.86	1024.7	350.5	4.0
8/21/91	03:00	-17.28	-22.86	353.80	363.99	22.68	-0.39	36.86	1024.7	350.6	3.9
8/21/91	04:00	-17.13	-22.68	353.85	364.50	22.63	-0.27		1022.3	352.3	6.3
8/21/91	05:00	-16.98	-22.51	353.84	365.69	22.43	-0.45	36.73	1022.3	350.7	4.7
8/21/91	06:00	-16.83	-22.33	353.87	365.52	22.74	-0.46		1022.3	350.1	4.3
8/21/91	07:00	-16.68	-22.16	353.99	365.77	22.81	-0.41		1022.3	351.2	5.3
8/21/91	08:00	-16.60	-22.03	353.97	366.12	22.82	-0.43	36.84	1022.2	351.1	5.3
8/21/91	09:00	-16.46	-21.86	353.93	366.28	22.82	-0.44		1022.2	351.0	5.3
8/21/91	10:00	-16.31	-21.68	353.89	362.31	22.96	-0.47		1022.2	346.6	1.0
8/21/91	11:00	-16.16	-21.51	353.93	363.72	22.89	-0.37	36.84	1022.2	349.7	3.9
8/21/91	12:00	-16.01	-21.33	353.90	361.74	22.86	-0.44		1023.3	347.1	0.9
8/21/91	13:00	-15.86	-21.15	353.91	360.64	22.86	-0.44		1022.7	345.8	-0.1
8/21/91	14:00	-15.71	-20.98	353.84	360.67	22.85	-0.42	36.85	1023.2	346.4	0.3

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/21/91	15:00	-15.57	-20.81	353.76	364.10	22.74	-0.44		1023.2	349.5	3.5
8/21/91	16:00	-15.43	-20.62	353.81	363.29	22.78	-0.46		1019.7	347.1	2.3
8/21/91	17:00	-15.29	-20.44	353.88	362.33	22.80	-0.44	36.85	1020.0	346.6	1.6
8/21/91	18:00	-15.15	-20.26	353.83	356.88	22.99	-0.47		1019.7	340.7	-4.0
8/21/91	19:00	-15.02	-20.09	353.75	357.56	22.94	-0.46		1019.7	341.6	-3.1
8/21/91	20:00	-14.89	-19.92	353.78	357.75	22.89	-0.46	36.87	1020.7	342.0	-3.0
8/21/91	21:00	-14.75	-19.74	353.76	357.07	22.97	-0.41		1021.1	342.3	-2.9
8/21/91	22:00	-14.60	-19.56	353.75	357.31	22.94	-0.43		1020.7	342.0	-3.0
8/21/91	23:00	-14.46	-19.38	353.77	358.33	22.80	-0.41	36.81	1020.7	343.5	-1.7
8/22/91	00:00	-14.31	-19.19	353.65	358.21	22.79	-0.47		1021.4	342.6	-2.6
8/22/91	01:00	-14.16	-19.01	353.67	357.50	22.77	-0.44		1021.4	342.5	-2.8
8/22/91	02:00	-14.02	-18.83	353.73	355.15	22.81	-0.41	36.80	1021.4	340.6	-4.8
8/22/91	03:00	-13.87	-18.65	353.70	355.52	22.76	-0.41		1021.4	341.0	-4.4
8/22/91	04:00	-13.71	-18.48	353.61	357.27	22.68	-0.42		1018.9	341.7	-2.8
8/22/91	05:00	-13.55	-18.31	353.71	357.87	22.60	-0.46		1018.9	341.7	-2.9
8/22/91	06:00	-13.40	-18.14	353.71	352.52	22.94	-0.47	36.80	1018.9	336.3	-8.1
8/22/91	07:00	-13.24	-17.96	353.70	352.68	23.01	-0.47	36.83	1018.9	336.4	-7.9
8/22/91	08:00	-13.09	-17.79	353.67	353.25	22.76	-0.44		1019.6	337.8	-6.9
8/22/91	09:00	-12.95	-17.61	353.69	350.42	22.96	-0.56	36.79	1019.6	333.1	-11.4
8/22/91	10:00	-12.82	-17.45	353.67	349.86	23.33	-0.47	36.77	1019.6	333.7	-10.6
8/22/91	11:00	-12.82	-17.46	353.84	351.04	23.37	-0.49		1019.6	334.5	-10.0
8/22/91	12:00	-12.71	-17.33	353.58	351.93	23.39	-0.44	36.81	1019.6	336.1	-8.1
8/22/91	13:00	-12.57	-17.16	353.64	353.36	23.26	-0.48	36.76	1019.6	337.0	-7.3
8/22/91	14:00	-12.47	-17.01	353.55	354.64	23.24	-0.44		1019.6	338.8	-5.5
8/22/91	15:00	-12.32	-16.83	353.58	351.65	23.25	-0.45	36.73	1019.6	335.9	-8.5
8/22/91	16:00	-12.18	-16.65			23.30	-0.45	36.77	1017.2		
8/22/91	17:00	-12.03	-16.47	353.67	348.37	23.39	-0.44	36.72	1017.2	331.9	-11.6
8/22/91	18:00	-11.88	-16.30	353.71	349.91	23.40	-0.42	36.75	1017.2	333.6	-9.9
8/22/91	19:00	-11.74	-16.13	353.75	352.63	23.33	-0.44	36.75	1017.2	336.1	-7.5
8/22/91	20:00	-11.59	-15.95	353.72	351.06	23.32	-0.44	36.74	1018.2	334.9	-9.0
8/22/91	21:00	-11.44	-15.77	353.74	352.98	22.98	-0.34	36.78	1018.2	338.4	-5.8
8/22/91	22:00	-11.29	-15.59	353.70	348.03	23.22	-0.45	36.75	1018.2	331.9	-12.0
8/22/91	23:00	-11.14	-15.41	353.74	350.60	23.21	-0.36	36.78	1018.2	335.7	-8.4
8/23/91	00:00	-10.99	-15.24	353.75	352.32	23.06	-0.41	36.76	1019.0	336.9	-7.5
8/23/91	01:00	-10.84	-15.06	353.63	351.27	23.13	-0.46	36.78	1019.0	335.2	-9.0
8/23/91	02:00	-10.72	-14.92	353.65	348.16	23.14	-0.45	36.69	1019.0	332.4	-11.9
8/23/91	03:00	-10.55	-14.70	353.59	344.05	23.36	-0.47	36.55	1019.0	328.0	-16.1
8/23/91	04:00	-10.41	-14.52	353.60	344.18	23.54	-0.49	36.48	1017.0	327.1	-16.2
8/23/91	05:00	-10.27	-14.34	353.62	344.15	23.94	-0.47	36.33	1017.0	327.1	-16.0
8/23/91	06:00	-10.14	-14.15	353.65	345.02	24.10	-0.42	36.24	1017.0	328.5	-14.4
8/23/91	07:00	-9.99	-13.97	353.70	345.78	24.11	-0.42	36.20	1017.0	329.3	-13.7
8/23/91	08:00	-9.85	-13.79	353.67	346.01	24.09	-0.42	36.15	1019.3	330.3	-13.5
8/23/91	09:00	-9.70	-13.61	353.70	342.42	24.09	-0.40	36.26	1019.3	327.1	-16.7
8/23/91	10:00	-9.56	-13.43	353.61	343.69	24.03	-0.45	36.28	1019.3	327.7	-16.1
8/23/91	11:00	-9.42	-13.26	353.59	344.54	24.02	-0.44	36.30	1019.3	328.6	-15.2
8/23/91	12:00	-9.27	-13.08	353.53	343.09	24.04	-0.51	36.10	1019.5	326.3	-17.4
8/23/91	13:00	-9.12	-12.91	353.56	351.80	24.25	-0.46	35.91	1019.5	335.2	-8.4
8/23/91	14:00	-8.97	-12.74	353.54	368.80	24.27	-0.53	35.72	1019.5	350.2	6.7
8/23/91	15:00	-8.82	-12.57	353.55	368.70	24.53	-0.44	35.77	1019.5	351.4	7.9
8/23/91	16:00	-8.67	-12.40	353.64	370.05	24.67	-0.52	35.78	1017.0	350.4	7.8
8/23/91	17:00	-8.53	-12.24	353.63	373.21	24.54	-0.43	35.71	1017.0	354.9	12.3
8/23/91	18:00	-8.39	-12.06	353.76	366.57	24.84	-0.28	35.79	1017.0	350.8	8.1
8/23/91	19:00	-8.24	-11.88	353.85	373.73	24.60	-0.27	35.67	1017.0	358.0	15.1
8/23/91	20:00	-8.09	-11.71	353.87	374.67	24.38	-0.41	35.62	1018.8	357.5	13.8
8/23/91	21:00	-7.92	-11.53	353.88	373.17	24.37	-0.40	35.65	1018.8	356.2	12.5
8/23/91	22:00	-7.76	-11.36	353.80	373.35	24.29	-0.35	35.68	1018.8	357.2	13.5
8/23/91	23:00	-7.61	-11.20	353.75	362.76	24.33	-0.52	35.87	1018.8	344.3	0.8
8/24/91	00:00	-7.44	-11.02	353.75	370.80	24.22	-0.49	35.69	1019.4	352.7	9.0
8/24/91	01:00	-7.28	-10.84	353.83	362.03	24.48	-0.36	35.79	1019.4	346.3	2.5
8/24/91	02:00	-7.15	-10.66	354.01	360.06	24.53	-0.35	35.91	1019.4	344.5	0.5
8/24/91	03:00	-7.01	-10.47	354.08	353.58	24.40	-0.45	35.91	1017.4	336.3	-7.1

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/24/91	04:00	-6.87	-10.28	354.18	357.95	24.54	-0.43	35.82	1017.3	340.6	-2.7
8/24/91	05:00	-6.75	-10.12	354.20	366.85	24.37	-0.38	35.72	1017.3	349.8	6.4
8/24/91	06:00	-6.61	-9.93	354.26	391.98	23.99	-0.42	35.75	1017.3	373.4	29.7
8/24/91	07:00	-6.46	-9.75	354.35	396.19	23.84	-0.41	35.65	1017.3	377.7	33.8
8/24/91	08:00	-6.32	-9.57	354.47	393.28	23.74	-0.43	35.58	1019.2	375.4	30.6
8/24/91	09:00	-6.18	-9.39	354.48	393.72	23.75	-0.42	35.59	1019.2	376.1	31.3
8/24/91	10:00	-6.03	-9.21	354.54	393.69	23.71	-0.44	35.61	1019.2	375.6	30.8
8/24/91	11:00	-5.98	-9.16	354.63	394.36	23.72	-0.50	35.61	1019.2	375.3	30.4
8/24/91	12:00	-5.93	-9.11	354.58	393.39	23.75	-0.47	35.61	1018.7	374.6	30.0
8/24/91	13:00	-5.78	-8.93	354.38	394.16	23.66	-0.46	35.53	1018.7	375.6	31.1
8/24/91	14:00	-5.62	-8.76	354.45	388.28	23.78	-0.51	35.42	1018.7	369.1	24.6
8/24/91	15:00	-5.46	-8.60	354.57	389.93	23.97	-0.47	35.40	1018.7	371.1	26.7
8/24/91	16:00	-5.31	-8.43	354.71	395.03	24.00	-0.42	35.41	1015.9	375.9	32.2
8/24/91	18:00	-5.00	-8.08	354.81	397.00	23.95	-0.42	35.51	1015.9	377.8	34.0
8/24/91	19:00	-4.87	-7.93	354.86	398.07	23.90	-0.42	35.55	1015.9	378.8	34.9
8/24/91	20:00	-4.73	-7.76	354.70	400.22	23.78	-0.34	35.56	1015.9	382.3	38.4
8/24/91	21:00	-4.59	-7.58	354.68	397.41	23.54	-0.42	35.56	1017.7	379.2	34.6
8/24/91	22:00	-4.45	-7.40	354.72	395.68	23.44	-0.44	35.56	1017.7	377.2	32.6
8/24/91	23:00	-4.30	-7.23	354.75	396.69	23.35	-0.42	35.59	1017.7	378.5	33.8
8/25/91	00:00	-4.15	-7.06	354.68	410.32	23.06	-0.40		1017.7	392.2	47.3
8/25/91	01:00	-4.02	-6.89	354.76	406.95	23.02	-0.45	35.69	1017.6	388.0	43.2
8/25/91	02:00	-3.87	-6.71	354.78	410.41	22.94	-0.43	35.70	1017.6	391.7	46.7
8/25/91	03:00	-3.72	-6.53	354.73	395.63	22.75	-0.40	35.49	1017.6	378.1	33.1
8/25/91	04:00	-3.57	-6.35	354.81	394.03	22.66	-0.39	35.41	1015.1	375.9	31.6
8/25/91	05:00	-3.42	-6.17	354.87	391.71	22.55	-0.45	35.38	1015.1	372.9	28.5
8/25/91	06:00	-3.26	-5.98	354.87	395.76	22.38	-0.45	35.40	1015.1	376.8	32.3
8/25/91	07:00	-3.11	-5.80	354.77	403.43	22.23	-0.34	35.49	1016.8	386.7	41.6
8/25/91	08:00	-2.95	-5.61	354.77	400.38	22.16	-0.47	35.58	1017.4	381.9	36.6
8/25/91	09:00	-2.80	-5.43	354.71	396.01	22.03	-0.41	35.58	1017.4	378.8	33.5
8/25/91	10:00	-2.65	-5.25	354.66	398.91	21.93	-0.50	35.47	1017.4	380.1	34.8
8/25/91	11:00	-2.51	-5.07	354.69	396.42	21.86	-0.48	35.52	1017.2	378.0	32.7
8/25/91	12:00	-2.36	-4.88	354.59	394.93	21.90	-0.41	35.45	1016.0	377.3	32.4
8/25/91	13:00	-2.20	-4.71	354.60	397.42	21.95	-0.45	35.49	1016.0	379.0	34.2
8/25/91	14:00	-2.03	-4.55	354.58	398.90	21.88	-0.55	35.42	1016.0	378.6	33.9
8/25/91	15:00	-2.01	-4.50	354.44	399.32	22.23	-0.41	35.40	1016.0	381.3	36.8
8/25/91	16:00	-2.01	-4.50	354.66	399.05	22.22	-0.45	35.46	1013.8	379.5	35.6
8/25/91	17:00	-2.01	-4.50	354.68	397.22	22.24	-0.40	35.36	1013.8	378.6	34.6
8/25/91	18:00	-2.01	-4.50	354.76	401.42	22.42	-0.20	35.41	1013.8	386.0	42.0
8/25/91	19:00	-2.04	-4.50	354.79	400.24	22.25	-0.29	35.50	1013.8	383.4	39.3
8/25/91	20:00	-2.17	-4.51	354.74	397.81	22.20	-0.41	35.43	1015.4	379.6	35.0
8/25/91	21:00	-2.27	-4.47	354.71	397.85	22.12	-0.35	35.51	1015.4	380.8	36.2
8/25/91	22:00	-2.20	-4.41	354.76	398.51	22.02	-0.29	35.53	1015.4	382.5	37.8
8/25/91	23:00	-2.04	-4.48	354.74	396.83	22.01	-0.54	35.39	1015.4	376.6	32.0
8/26/91	00:00	-2.04	-4.49	354.74	395.41	21.96	-0.47		1015.8	376.6	31.7
8/26/91	01:00	-2.03	-4.51	354.71	396.31	22.00	-0.47	35.41	1015.2	377.2	32.6
8/26/91	02:00	-2.02	-4.53	354.71	395.72	21.91	-0.48		1015.8	376.8	32.0
8/26/91	03:00	-2.00	-4.55	354.71	395.26	21.86	-0.45	35.40	1015.8	376.8	32.0
8/26/91	04:00	-1.99	-4.56	354.73	395.87	21.79	-0.48	35.40	1014.5	376.5	32.0
8/26/91	05:00	-1.99	-4.57	354.70	396.70	21.76	-0.46		1014.8	377.8	33.2
8/26/91	06:00	-1.98	-4.57	354.71	397.31	21.73	-0.48	35.36	1015.1	378.2	33.5
8/26/91	07:00	-1.98	-4.58	354.76	398.10	21.73	-0.48	35.35	1014.5	378.7	34.2
8/26/91	08:00	-1.97	-4.58	354.82	398.06	21.76	-0.48		1016.5	379.3	34.0
8/26/91	09:00	-1.98	-4.56	354.85	397.76	21.82	-0.55	35.36	1017.4	378.2	32.7
8/26/91	10:00	-2.00	-4.50	354.99	394.26	21.89	-0.48	35.38	1017.6	376.1	30.4
8/26/91	11:00	-2.01	-4.50	355.05	395.04	21.97	-0.49	35.36	1016.6	376.2	30.8
8/26/91	12:00	-2.00	-4.51	354.99	395.25	21.97	-0.58	35.36	1016.5	374.8	29.6
8/26/91	13:00	-1.99	-4.52	354.94	397.10	22.03	-0.48	35.40	1016.5	378.3	33.1
8/26/91	14:00	-2.01	-4.52	354.89	396.97	22.13	-0.40	35.39	1014.6	378.8	34.3
8/26/91	15:00	-2.01	-4.53	354.90	397.17	22.12	-0.48	35.36	1016.5	378.3	33.2
8/26/91	16:00	-2.02	-4.53	354.92	396.49	22.26	-0.31	35.38	1013.8	379.5	35.3
8/26/91	17:00	-1.90	-4.73	354.94	401.50	22.12	-0.35	35.43	1013.8	383.7	39.4

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/26/91	19:00	-1.62	-5.15	354.97	395.65	22.12	-0.53	35.29	1014.7	375.3	30.7
8/26/91	20:00	-1.48	-5.35	355.09	403.48	22.08	-0.40	35.33	1015.4	385.3	40.3
8/26/91	21:00	-1.34	-5.56	355.16	400.08	22.06	-0.44	35.31	1015.9	381.5	36.2
8/26/91	22:00	-1.20	-5.77	355.23	399.98	21.89	-0.34	35.36	1016.7	383.5	37.8
8/26/91	23:00	-1.07	-5.98	355.26	400.07	21.70	-0.60	35.31	1015.4	378.8	33.6
8/27/91	00:00	-0.93	-6.20	355.25	400.91	21.70	-0.57	35.45	1016.4	380.5	34.9
8/27/91	01:00	-0.80	-6.41	355.12	404.89	21.74	-0.48	35.41	1016.0	385.7	40.3
8/27/91	02:00	-0.67	-6.62	355.10	407.24	21.73	-0.33	35.43	1015.8	390.5	45.1
8/27/91	03:00	-0.54	-6.84	355.13	410.69	21.73	-0.44	35.46	1016.4	392.0	46.4
8/27/91	04:00	-0.40	-7.05	355.11	420.72	21.72	-0.41	35.48	1015.5	401.9	56.6
8/27/91	05:00	-0.27	-7.27	355.21	416.57	21.81	-0.41	35.51	1015.5	397.9	52.5
8/27/91	06:00	-0.14	-7.49	355.12	412.49	21.86	-0.49	35.46	1015.5	392.5	47.3
8/27/91	07:00	-0.01	-7.70	355.14	411.09	21.99	-0.43	35.50	1015.5	392.0	46.9
8/27/91	08:00	0.12	-7.92	355.10	412.55	22.13	-0.46	35.47	1017.7	393.8	48.0
8/27/91	09:00	0.26	-8.13	355.04	408.48	22.23	-0.48	35.48	1017.7	389.5	43.9
8/27/91	10:00	0.40	-8.35	355.04	392.17	22.05	-0.48	35.44	1018.6	374.3	28.3
8/27/91	11:00	0.54	-8.57	355.04	399.09	22.41	-0.51	35.36	1018.4	380.1	34.3
8/27/91	12:00	0.69	-8.77	354.98	407.39	22.46	-0.51	35.46	1017.6	387.7	42.3
8/27/91	13:00	0.83	-8.98	354.98	410.93	22.58	-0.51	35.49	1017.6	390.9	45.6
8/27/91	14:00	0.98	-9.19	354.96	406.35	22.61	-0.52	35.53	1017.6	386.4	41.2
8/27/91	15:00	1.13	-9.40	354.94	429.40	22.65	-0.49	35.56	1015.7	408.1	63.6
8/27/91	16:00	1.27	-9.61	354.97	403.27	22.65	-0.47	35.53	1014.8	383.3	39.0
8/27/91	17:00	1.41	-9.82	354.82	407.38	22.85	-0.50	35.48	1014.8	386.6	42.5
8/27/91	18:00	1.55	-10.04	354.73	408.28	22.98	-0.49	35.58	1014.8	387.4	43.5
8/27/91	19:00	1.70	-10.25	354.69	417.17	23.15	-0.40	35.62	1015.2	397.5	53.6
8/27/91	20:00	1.84	-10.46	354.64	409.32	23.21	-0.42	35.62	1015.3	389.7	45.9
8/27/91	21:00	1.96	-10.67	354.65	396.82	23.10	-0.45	35.32	1015.7	377.6	33.5
8/27/91	22:00	2.09	-10.89	354.69	385.09	23.50	-0.85	35.06	1015.7	359.5	15.9
8/27/91	23:00	2.21	-11.11	354.56	338.94	25.34	-0.48	35.18	1016.8	321.0	-21.9
8/28/91	00:00	2.33	-11.32	354.46	345.06	25.61	-0.37	35.21	1016.3	328.2	-14.4
8/28/91	01:00	2.46	-11.52	354.45	345.12	25.72	-0.30	35.19	1016.1	329.1	-13.3
8/28/91	02:00	2.43	-11.74	354.40	345.41	25.76	-0.35	35.24	1016.3	328.8	-13.6
8/28/91	03:00	2.34	-11.97	354.39	345.61	25.72	-0.34	35.23	1016.3	329.1	-13.4
8/28/91	04:00	2.24	-12.20	354.44	345.55	25.63	-0.31	35.20	1015.7	329.4	-13.0
8/28/91	05:00	2.14	-12.43	354.47	345.36	25.50	-0.37	35.15	1016.0	328.5	-14.1
8/28/91	06:00	2.05	-12.66	354.49	345.92	25.44	-0.36	35.11	1016.2	329.2	-13.5
8/28/91	07:00	1.95	-12.89	354.53	346.04	25.40	-0.37	35.12	1015.7	329.0	-13.6
8/28/91	08:00	1.86	-13.13	354.55	346.30	25.40	-0.38	35.13	1016.8	329.6	-13.4
8/28/91	09:00	1.76	-13.37	354.54	346.19	25.44	-0.38	35.15	1016.8	329.4	-13.5
8/28/91	10:00	1.66	-13.61	354.56	345.73	25.47	-0.36	35.15	1016.8	329.2	-13.8
8/28/91	11:00	1.64	-13.67	354.44	347.22	25.49	-0.44	35.15	1016.8	329.4	-13.4
8/28/91	12:00	1.58	-13.82	354.36	346.48	25.50	-0.40	35.16	1017.9	329.7	-13.4
8/28/91	13:00	1.48	-14.06		350.81	25.54	-0.42	35.15	1017.9	333.5	-9.5
8/28/91	14:00	1.37	-14.30	354.40	350.72	25.56	-0.39	35.15	1017.9	333.9	-9.2
8/28/91	15:00	1.27	-14.54	354.32	350.85	25.50	-0.39	35.15	1017.9	334.0	-9.1
8/28/91	16:00	1.17	-14.79	354.18	351.18	25.50	-0.40	35.14	1014.7	333.0	-8.8
8/28/91	17:00	1.07	-15.03	354.11	351.03	25.45	-0.41	35.15	1014.7	332.7	-9.0
8/28/91	18:00	0.97	-15.28	353.93	352.87	25.47	-0.39	35.17	1014.7	334.8	-6.8
8/28/91	19:00	0.88	-15.53	353.98	350.15	25.51	-0.39	35.20	1014.7	332.2	-9.4
8/28/91	20:00	0.79	-15.78	354.02	347.00	25.44	-0.35	35.24	1015.1	330.0	-11.9
8/28/91	21:00	0.69	-16.04	354.11	348.03	25.22	-0.34	35.27	1015.5	331.4	-10.8
8/28/91	22:00	0.59	-16.29	354.15	357.57	24.64	-0.39	35.20	1015.1	340.0	-2.5
8/28/91	23:00	0.49	-16.53	354.14	360.70	24.57	-0.38	35.15	1015.1	343.2	0.7
8/29/91	00:00	0.39	-16.77	354.13	368.36	24.36	-0.37		1017.1	351.4	8.1
8/29/91	01:00	0.28	-17.01	354.10	374.51	24.21	-0.38	35.20	1017.1	357.3	13.9
8/29/91	02:00	0.15	-17.24	354.07	387.55	24.03	-0.40	35.53	1017.1	369.4	26.0
8/29/91	03:00	0.02	-17.46	354.11	388.93	24.00	-0.46	35.57	1017.1	369.8	26.3
8/29/91	04:00	-0.09	-17.66	354.11	389.35	24.13	-0.47	35.59	1017.1	369.8	26.5
8/29/91	05:00	-0.09	-17.65	354.07	390.57	24.15	-0.46	35.61	1017.1	371.3	28.0
8/29/91	06:00	-0.09	-17.65	354.10	389.42	24.10	-0.47	35.59	1017.1	370.0	26.6
8/29/91	07:00	-0.10	-17.65	354.10	390.16	24.09	-0.47	35.60	1015.1	370.0	27.3

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/29/91	08:00	-0.10	-17.65	354.13	390.17	24.10	-0.47	35.60	1013.8	369.6	27.3
8/29/91	09:00	-0.10	-17.64	354.12	389.32	24.09	-0.46	35.60	1017.1	370.1	26.7
8/29/91	10:00	-0.10	-17.66	354.12	389.08	24.10	-0.48	35.60	1017.1	369.5	26.1
8/29/91	11:00	-0.11	-17.69	354.00	389.81	24.14	-0.49	35.59	1017.1	370.1	27.5
8/29/91	12:00	-0.21	-17.93	354.06	392.81	24.18	-0.45	35.64	1014.8	372.6	30.1
8/29/91	13:00	-0.30	-18.17	354.05	404.85	24.17	-0.49	35.77	1014.2	383.1	40.8
8/29/91	14:00	-0.37	-18.41	353.99	404.31	24.39	-0.48	35.78	1016.0	383.4	40.7
8/29/91	15:00	-0.43	-18.65	353.98	402.69	24.67	-0.44	35.77	1016.0	382.4	39.8
8/29/91	16:00	-0.48	-18.89	353.91	395.92	24.76	-0.44	35.77	1013.5	374.8	33.3
8/29/91	17:00	-0.57	-19.11	354.05	393.89	24.84	-0.45	35.75	1012.8	372.4	31.0
8/29/91	18:00	-0.66	-19.33	354.25	387.61	24.91	-0.45	35.71	1012.8	366.4	24.9
8/29/91	19:00	-0.74	-19.54	354.40	384.66	24.92	-0.43	35.72	1012.9	364.1	22.4
8/29/91	20:00	-0.83	-19.76	354.52	384.15	24.89	-0.42	35.71	1013.6	364.1	22.0
8/29/91	21:00	-0.93	-19.97	354.61	383.27	24.93	-0.42	35.68	1014.1	363.4	21.0
8/29/91	22:00	-1.02	-20.18	354.44	380.07	24.98	-0.36		1014.7	361.5	19.1
8/29/91	23:00	-1.11	-20.40	354.69	381.57	24.98	-0.44	35.68	1013.9	361.3	19.0
8/30/91	00:00	-1.20	-20.62	354.67	377.64	25.05	-0.38		1015.7	359.2	16.3
8/30/91	01:00	-1.29	-20.84	354.64	377.45	25.06	-0.40		1015.7	358.6	15.7
8/30/91	02:00	-1.38	-21.06	354.59	377.55	25.07	-0.39	35.68	1014.5	358.4	16.0
8/30/91	03:00	-1.47	-21.28	354.44	377.00	25.06	-0.40	35.68	1014.3	357.7	15.5
8/30/91	04:00	-1.56	-21.51	354.38	376.80	25.08	-0.38		1013.8	357.6	15.6
8/30/91	05:00	-1.66	-21.73	354.32	376.30	25.09	-0.39	35.68	1013.0	356.8	15.2
8/30/91	06:00	-1.75	-21.95	354.21	378.67	25.03	-0.36	35.68	1013.0	359.5	17.9
8/30/91	07:00	-1.85	-22.18	354.25	378.78	25.03	-0.40		1013.0	358.9	17.4
8/30/91	08:00	-1.94	-22.39	354.23	378.70	25.04	-0.38	35.66	1013.9	359.6	17.7
8/30/91	09:00	-2.03	-22.62	354.31	377.24	25.03	-0.39	35.65	1013.9	357.9	16.0
8/30/91	10:00	-2.13	-22.85	354.38	376.91	25.08	-0.39		1013.9	357.7	15.7
8/30/91	11:00	-2.22	-23.07	354.43	377.78	25.07	-0.41	35.65	1013.9	358.2	16.1
8/30/91	12:00	-2.31	-23.30	354.77	379.37	25.10	-0.43	35.66	1014.7	359.7	17.0
8/30/91	13:00	-2.41	-23.52	354.58	381.88	25.12	-0.45		1015.0	361.7	19.3
8/30/91	14:00	-2.50	-23.75	354.66	383.65	25.20	-0.44	35.71	1014.3	363.2	21.0
8/30/91	15:00	-2.59	-23.97	354.77	384.35	25.25	-0.45		1014.7	363.9	21.4
8/30/91	16:00	-2.68	-24.20	354.83	386.25	25.30	-0.46		1013.0	364.9	22.9
8/30/91	17:00	-2.76	-24.43	354.79	387.91	25.35	-0.39	35.78	1012.8	367.5	25.6
8/30/91	18:00	-2.86	-24.65	365.05	403.84	25.33	-0.47		1012.8	381.3	39.5
8/30/91	19:00	-2.95	-24.88	354.78	400.39	25.38	-0.44		1012.8	378.4	36.7
8/30/91	20:00	-3.01	-24.99	354.94	400.77	25.41	-0.46	35.86	1013.7	378.7	36.5
8/30/91	21:00	-3.01	-24.99	354.90	400.02	25.40	-0.44		1012.8	378.0	36.1
8/30/91	22:00	-3.01	-24.99	354.95	399.41	25.40	-0.44		1012.8	377.5	35.5
8/30/91	23:00	-3.01	-24.98	354.95	398.80	25.39	-0.43	35.86	1012.8	377.0	35.1
8/31/91	00:00	-3.02	-24.96	354.87	398.64	25.38	-0.40		1012.8	377.4	35.5
8/31/91	01:00	-3.07	-24.90	354.74	398.79	25.36	-0.42		1015.3	378.3	35.6
8/31/91	02:00	-3.08	-24.90	354.65	399.07	25.35	-0.42		1015.3	378.5	36.0
8/31/91	03:00	-3.09	-24.89	354.52	399.34	25.34	-0.42		1015.3	378.7	36.3
8/31/91	04:00	-3.10	-24.89	354.38	399.45	25.33	-0.42		1013.9	378.3	36.5
8/31/91	05:00	-3.11	-24.88	354.24	399.69	25.33	-0.42		1013.9	378.6	36.9
8/31/91	06:00	-3.12	-24.88	353.94	399.66	25.32	-0.42		1013.9	378.5	37.1
8/31/91	07:00	-3.13	-24.87	353.96	399.63	25.31	-0.42		1013.9	378.4	37.0
8/31/91	08:00	-3.14	-24.87	354.00	399.67	25.30	-0.43		1014.8	378.8	37.0
8/31/91	09:00	-3.15	-24.88	354.01	399.19	25.30	-0.43		1014.8	378.3	36.5
8/31/91	10:00	-3.14	-24.90	354.14	398.17	25.30	-0.40		1014.8	377.9	35.9
8/31/91	11:00	-3.10	-24.92	354.37	399.38	25.31	-0.44		1014.8	378.3	36.1
8/31/91	12:00	-3.10	-24.91	354.34	399.71	25.32	-0.45		1015.5	378.6	36.3
8/31/91	13:00	-3.11	-24.90	354.82	400.75	25.35	-0.46		1015.5	379.5	36.8
8/31/91	14:00	-3.13	-24.90	354.87	401.23	25.38	-0.46		1015.5	380.0	37.2
8/31/91	15:00			354.88	401.84	25.40	-0.48		1015.5	380.1	37.4
8/31/91	16:00	-3.17	-24.87	354.90	402.33	25.41	-0.48		1012.8	379.5	37.7
8/31/91	17:00	-3.19	-24.84	354.73	402.35	25.43	-0.47		1012.8	379.7	38.1
8/31/91	18:00	-3.22	-24.81	354.66	401.74	25.42	-0.45		1012.8	379.4	37.8
8/31/91	19:00	-3.25	-24.78	354.54	401.31	25.46	-0.39		1012.8	380.1	38.6
8/31/91	20:00	-3.28	-24.75	354.53	400.54	25.46	-0.35		1013.7	380.4	38.5

NOAA South Atlantic 1991 Underway Values

Leg 2 Carbon and Related Parameters

Date	Time	Lat [degrees]	Long [degrees]	XCO2,a [ppm]	XCO2,w [ppm]	SST [deg. C]	SST-Eq.T [deg. C]	Sal(TSG)	Pressure [mb]	fCO2, w [uatm]	fCO2,w-a [uatm]
8/31/91	21:00	-3.31	-24.97	354.55	397.91	25.36	-0.38		1013.7	377.4	35.5
8/31/91	22:00	-3.31	-25.22	354.58	398.75	25.33	-0.41		1013.7	377.7	35.8
8/31/91	23:00	-3.31	-25.47	354.65	394.82	25.30	-0.30		1013.7	376.0	33.9
9/1/91	00:00	-3.32	-25.72	354.61	395.54	25.20	-0.38	35.66	1015.3	376.0	33.3
9/1/91	01:00	-3.33	-25.96	354.70	393.63	25.30	-0.56	35.64	1015.3	370.9	28.4
9/1/91	02:00	-3.35	-26.21	354.61	381.59	25.70	-0.39	35.84	1015.3	362.2	19.9
9/1/91	03:00	-3.36	-26.46	354.55	382.03	25.72	-0.35	35.87	1015.3	363.2	21.0
9/1/91	04:00	-3.38	-26.71	354.56	384.49	25.70	-0.37	35.83	1014.1	364.8	23.0
9/1/91	05:00	-3.40	-26.97	354.55	386.95	25.71	-0.32	35.84	1014.1	368.0	26.1
9/1/91	06:00	-3.42	-27.22	354.66	388.75	25.65	-0.36	35.77	1014.1	369.1	27.1
9/1/91	07:00	-3.44	-27.47	354.50	390.89	25.53	-0.38	35.70	1014.2	370.9	29.0
9/1/91	08:00	-3.46	-27.73	354.48	389.76	25.54	-0.38	35.69	1014.7	370.0	28.0
9/1/91	09:00	-3.48	-27.98	354.53	388.44	25.57	-0.37	35.70	1014.7	368.8	26.7
9/1/91	10:00	-3.50	-28.24	354.37	388.31	25.61	-0.39	35.72	1014.7	368.4	26.5
9/1/91	11:00	-3.52	-28.49	354.21	387.60	25.67	-0.38	35.75	1014.7	367.7	26.0
9/1/91	12:00	-3.54	-28.75	354.23	387.62	25.72	-0.38	35.76	1015.9	368.3	26.1
9/1/91	13:00	-3.56	-29.00	354.10	387.68	25.75	-0.42	35.72	1015.9	367.6	25.6
9/1/91	14:00	-3.57	-29.26	353.89	388.40	25.78	-0.40	35.73	1015.9	368.6	26.9
9/1/91	15:00	-3.59	-29.52	353.83	390.03	25.74	-0.42	35.71	1015.9	369.9	28.2
9/1/91	16:00	-3.61	-29.77	353.86	393.71	25.72	-0.41	35.70	1013.6	372.6	31.6
9/1/91	21:00	-3.69	-31.05	354.23	384.64	25.78	-0.35	35.97	1014.7	365.5	23.8
9/1/91	22:00	-3.71	-31.30	354.40	384.56	25.79	-0.36	35.97	1014.7	365.1	23.3
9/1/91	23:00	-3.72	-31.55	354.61	386.61	25.82	-0.36	36.01	1014.7	367.2	25.2
9/2/91	00:00	-3.69	-31.79	354.70	386.44	25.89	-0.34	36.03	1016.6	368.0	25.3
9/2/91	01:00	-3.72	-32.04	354.72	382.68	25.85	-0.36	35.95	1016.6	364.1	21.4
9/2/91	02:00	-3.74	-32.29	354.73	383.74	25.88	-0.35	35.99	1016.6	365.2	22.5
9/2/91	03:00	-3.75	-32.54	354.56	391.19	25.84	-0.35	36.05	1015.7	372.0	29.7
9/2/91	04:00	-3.73	-32.79	354.52	393.34	25.86	-0.34	36.07	1015.2	374.0	31.9
9/2/91	05:00	-3.71	-33.03	354.68	392.04	25.93	-0.34	36.09	1015.2	372.8	30.5
9/2/91	06:00	-3.69	-33.28	354.79	393.01	25.92	-0.34	36.08	1015.2	373.7	31.4
9/2/91	07:00	-3.66	-33.53	354.77	391.32	25.95	-0.34	36.08	1015.2	372.0	29.7
9/2/91	08:00	-3.63	-33.78	354.81	391.24	25.96	-0.35	36.07	1015.7	372.0	29.5
9/2/91	09:00	-3.61	-34.03	355.14	390.90	25.99	-0.34	36.08	1015.7	371.7	29.0
9/2/91	10:00	-3.58	-34.29	354.92	390.20	25.96	-0.33	36.08	1015.7	371.3	28.7
9/2/91	11:00	-3.55	-34.54	354.97	390.69	25.93	-0.37	36.06	1017.6	371.9	28.5
9/2/91	12:00	-3.52	-34.79	354.94	391.43	25.92	-0.38	36.05	1017.4	372.3	29.1
9/2/91	13:00	-3.52	-35.04	355.11	389.88	25.98	-0.38	36.08	1017.4	370.8	27.4
9/2/91	14:00	-3.48	-35.03	355.11	390.03	26.00	-0.38	36.07	1017.4	370.9	27.5
9/2/91	15:00	-3.46	-35.05	355.56	391.63	26.00	-0.40	36.06	1017.4	372.0	28.3

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