Low level Nitrate concentrations from TM or CTD casts from R/V Thomas G. Thompson TT043, TT053 cruises in the Arabian Sea in 1995 (U.S. JGOFS Arabian Sea project)

Website: https://www.bco-dmo.org/dataset/2532
Version: May 23, 2001
Version Date: 2001-05-23

Project
» U.S. JGOFS Arabian Sea (Arabian Sea)

Program
» U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Contributors	Affiliation	Role
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Dataset Description

Low level Nitrate concentrations from TM or CTD casts

Methods & Sampling

See Platform deployments for cruise specific documentation

Data Processing Description

Garside's Methodology for Low Level Nitrate Measurements

In many oceanic systems subject to seasonal nutrient supply, nutrient concentrations in the euphotic zone periodically fall below the detection limit of colorimetric methods, and low level detection methods are required for their analysis.

During Process Cruise 1 and 6 samples were taken for nitrate analysis at the nano-molar concentration level as part of the 15N isotope studies done by McCarthy and Nevins. McCarthy and Nevins provided the samples for shore based analysis. Samples were taken from the TM/CTD into c.a. 25 cc scintillation vials pre-rinsed several times with sample. Vials were 2/3 filled and 1cc of concentrated sulfuric acid was added to stop biological activity. Filtration was not employed because the potential for contamination at low concentrations generally exceeds the likelihood of particulate contamination problems. Samples were stored refrigerated in the dark, except during transit from Oman to BLOS. Acid blanks in DIW and DIW blanks were taken to check preservative contamination.

Samples were analyzed with the method described by Garside (1982) with the following modifications. The reagents were degassed on a separate helium impinger allowing a higher analytical rate; the three way stopcock was replaced with solenoid valves controlled by a computer program; and the integration was achieved with an A:D converter signal supplied to the computer program.

Calibration was based on the addition of ul quantities of a 1 uM standard to an ASW reagent matrix mimicking the sample matrix, and a linear response (0 -100 nM) was established relative to calibration blanks prior to sample analysis. Additional standards were run periodically during each run to check that the analytical response was not deteriorating. Data reduction involved computing the linear regression of integrator signal versus standard concentration, and employing this regression with the sample integrator resposnse to compute sample concentrations. The standard error of the estimate for these regressions was 1 - 2 nM using 10ml samples (appropriate for the 0-100nM range) in a total of 14 runs. Higher concentrations required lesser sample volumes and the reagent matrix was compensated with ASW to maintain a final SW/ASW volume of 10ml. For these samples the standard error is proportionately larger, but still at c.a. 1-2% of their concentration.

A total of 659 samples in duplicate, DIW and DIW plus acid blanks were analyzed. Generally blanks were satisfactory, with few exceptions, but several samples contained contaminants, which often were absent on re-analysis suggesting that they were particulate, or otherwise non-homogeneous. The signal from these contaminants provided a broad signal peak lasting for 10 - 20 minutes, completely obscuring the NOx signal which they in no way resembled, and cost many hours of lost time. Had the analyses been run on board ship, the problem would have been identified and filtration employed, demonstrating one of the perils of sample preservation and later analysis ashore. Nevertheless, no sample was entirely lost, and the lower of very disparate duplicates was taken to be correct. Thus, single (lower) values are archived for each sample.

In the 150 - 1500 nM range we have compared NOx analysis with the CFA colorimetric analyses, and on both cruises the CFA concentrations fall in the range of 0 - 0.2 uM higher than the NOx data. Since the difference is within the precision of the CFA, and the data are obviously skewed because negative concentrations are precluded, we conclude that the two data sets are consistent.

Garside C., 1982. A chemiluminescent technique for the determination of nanomolar concentrations of nitrate and nitrite in seawater. Marine Chemistry 11. 159-167.

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Data Files

File
low_level_NO3_TT043.csv(Comma Separated Values (.csv), 916 bytes) MD5:351144b2e3001411efd35736ec4b73e5 version May 23, 2001 Christopher Garside Low Level Nitrate Measurements from TM Casts Thomas Thompson cruise TTN-043; Process Cruise 1
low_level_NO3_TT053.csv (Comma Separated Values (.csv), 3.26 KB) MD5:5013a39e7e6e453509a655473dddef63 version May 23, 2001 Christopher Garside Low Level Nitrate Measurements from CTD rosette casts Thomas Thompson cruise TTN-053; Process Cruise 6

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Parameters

Parameter	Description	Units
event	event number from event log	
sta	station number from event log	
sta_std	Arabian Sea standard station identifier	
cast	cast number from event log	
bot	bottle number from trace metal cast	
depth	observed sample depth	meters
NO3_nano	low level nitrate concentration	nanomoles/liter
press	observed sample depth	meters

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Instruments

Dataset-specific Instrument Name	Trace Metal Bottle
Generic Instrument Name	Trace Metal Bottle
Dataset-specific Description	Trace Metal (TM) Rosette bottles
Generic Instrument Description	Trace metal (TM) clean rosette bottle used for collecting trace metal clean seawater samples.

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Deployments

TT043

Website	https://www.bco-dmo.org/deployment/57704
Platform	R/V Thomas G. Thompson
Report	http://osprey.bcodmo.org/datasetDeployment.cfm?ddid=2580&did=353&flag=view
Start Date	1995-01-08
End Date	1995-02-05

Description	Purpose: Process Cruise #1 (Late NE Monsoon) **Methods & Sampling** PI: Christopher Garside of: Bigelow Laboratory dataset: Low level Nitrate concentrations from TM casts dates: January 15, 1995 to January 29, 1995 location: N: 17.6829 S: 9.9986 W: 58.8353 E: 68.7499 project/cruise: Arabian Sea/TN043 - Process Cruise 1 (Late NE Monsoon) ship: Thomas Thompson **Processing Description** Garside's Methodology for Low Level Nitrate Measurements In many oceanic systems subject to seasonal nutrient supply, nutrient concentrations in the euphotic zone periodically fall below the detection limit of colorimetric methods, and low level detection methods are required for their analysis. During Process Cruise 1 and 6 samples were taken for nitrate analysis at the nano-molar concentration level as part of the 15N isotope studies done by McCarthy and Nevins. McCarthy and Nevins provided the samples for shore based analysis. Samples were taken from the TM/CTD into c.a. 25 cc scintillation vials pre-rinsed several times with sample. Vials were 2/3 filled and 1cc of concentrated sulfuric acid was added to stop biological activity. Filtration was not employed because the potential for contamination at low concentrations generally exceeds the likelihood of particulate contamination problems. Samples were stored refrigerated in the dark, except during transit from Oman to BLOS. Acid blanks in DIW and DIW blanks were taken to check preservative contamination. Samples were analyzed with the method described by Garside (1982) with the following modifications. The reagents were degassed on a separate helium impinger allowing a higher analytical rate; the three way stopcock was replaced with solenoid valves controlled by a computer program; and the integration was achieved with an A:D converter signal supplied to the computer program. Calibration was based on the addition of ul quantities of a 1 uM standard to an ASW reagent matrix mimicking the sample matrix, and a linear response (0 -100 nM) was established relative to calibration blanks prior to sample analysis. Additional standards were run periodically during each run to check that the analytical response was not deteriorating. Data reduction involved computing the linear regression of integrator signal versus standard concentration, and employing this regression with the sample integrator resposnse to compute sample concentrations. The standard error of the estimate for these regressions was 1 - 2 nM using 10ml samples (appropriate for the 0-100nM range) in a total of 14 runs. Higher concentrations required lesser sample volumes and the reagent matrix was compensated with ASW to maintain a final SW/ASW volume of 10ml. For these samples the standard error is proportionately larger, but still at c.a. 1-2% of their concentration. A total of 659 samples in duplicate, DIW and DIW plus acid blanks were analyzed. Generally blanks were satisfactory, with few exceptions, but several samples contained contaminants, which often were absent on re-analysis suggesting that they were particulate, or otherwise non-homogeneous. The signal from these contaminants provided a broad signal peak lasting for 10 - 20 minutes, completely obscuring the NOx signal which they in no way resembled, and cost many hours of lost time. Had the analyses been run on board ship, the problem would have been identified and filtration employed, demonstrating one of the perils of sample preservation and later analysis ashore. Nevertheless, no sample was entirely lost, and the lower of very disparate duplicates was taken to be correct. Thus, single (lower) values are archived for each sample. In the 150 - 1500 nM range we have compared NOx analysis with the CFA colorimetric analyses, and on both cruises the CFA concentrations fall in the range of 0 - 0.2 uM higher than the NOx data. Since the difference is within the precision of the CFA, and the data are obviously skewed because negative concentrations are precluded, we conclude that the two data sets are consistent. Garside C., 1982. A chemiluminescent technique for the determination of nanomolar concentrations of nitrate and nitrite in seawater. Marine Chemistry 11. 159-167.

TT053

Website	https://www.bco-dmo.org/deployment/57714
Platform	R/V Thomas G. Thompson
Start Date	1995-10-29
End Date	1995-11-26
Description	**Methods & Sampling** PI: Christopher Garside of: Bigelow Laboratory dataset: Low level Nitrate concentrations from CTD casts dates: October 30, 1995 to November 21, 1995 location: N: 23.9123 S: 10.0848 W: 56.4858 E: 67.1666 project/cruise: Arabian Sea/TN053 - Process Cruise 6 (bio-optics) ship: Thomas Thompson Samples were obtained from the CTD rosette. The trace metal-clean (TM) rosette package was lost on a previous cruise. **Processing Description** Garside's Methodology for Low Level Nitrate Measurements In many oceanic systems subject to seasonal nutrient supply, nutrient concentrations in the euphotic zone periodically fall below the detection limit of colorimetric methods, and low level detection methods are required for their analysis. During Process Cruise 1 and 6 samples were taken for nitrate analysis at the nano-molar concentration level as part of the 15N isotope studies done by McCarthy and Nevins. McCarthy and Nevins provided the samples for shore based analysis. Samples were taken from the TM/CTD into c.a. 25 cc scintillation vials pre-rinsed several times with sample. Vials were 2/3 filled and 1cc of concentrated sulfuric acid was added to stop biological activity. Filtration was not employed because the potential for contamination at low concentrations generally exceeds the likelihood of particulate contamination problems. Samples were stored refrigerated in the dark, except during transit from Oman to BLOS. Acid blanks in DIW and DIW blanks were taken to check preservative contamination. Samples were analyzed with the method described by Garside (1982) with the following modifications. The reagents were degassed on a separate helium impinger allowing a higher analytical rate; the three way stopcock was replaced with solenoid valves controlled by a computer program; and the integration was achieved with an A:D converter signal supplied to the computer program. Calibration was based on the addition of ul quantities of a 1 uM standard to an ASW reagent matrix mimicking the sample matrix, and a linear response (0 -100 nM) was established relative to calibration blanks prior to sample analysis. Additional standards were run periodically during each run to check that the analytical response was not deteriorating. Data reduction involved computing the linear regression of integrator signal versus standard concentration, and employing this regression with the sample integrator resposnse to compute sample concentrations. The standard error of the estimate for these regressions was 1 - 2 nM using 10ml samples (appropriate for the 0-100nM range) in a total of 14 runs. Higher concentrations required lesser sample volumes and the reagent matrix was compensated with ASW to maintain a final SW/ASW volume of 10ml. For these samples the standard error is proportionately larger, but still at c.a. 1-2% of their concentration. A total of 659 samples in duplicate, DIW and DIW plus acid blanks were analyzed. Generally blanks were satisfactory, with few exceptions, but several samples contained contaminants, which often were absent on re-analysis suggesting that they were particulate, or otherwise non-homogeneous. The signal from these contaminants provided a broad signal peak lasting for 10 - 20 minutes, completely obscuring the NOx signal which they in no way resembled, and cost many hours of lost time. Had the analyses been run on board ship, the problem would have been identified and filtration employed, demonstrating one of the perils of sample preservation and later analysis ashore. Nevertheless, no sample was entirely lost, and the lower of very disparate duplicates was taken to be correct. Thus, single (lower) values are archived for each sample. In the 150 - 1500 nM range we have compared NOx analysis with the CFA colorimetric analyses, and on both cruises the CFA concentrations fall in the range of 0 - 0.2 uM higher than the NOx data. Since the difference is within the precision of the CFA, and the data are obviously skewed because negative concentrations are precluded, we conclude that the two data sets are consistent. Garside C., 1982. A chemiluminescent technique for the determination of nanomolar concentrations of nitrate and nitrite in seawater. Marine Chemistry 11. 159-167.

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Project Information

U.S. JGOFS Arabian Sea (Arabian Sea)

Website: http://usjgofs.whoi.edu/research/arabian.html

Coverage: Arabian Sea

The U.S. Arabian Sea Expedition which began in September 1994 and ended in January 1996, had three major components: a U.S. JGOFS Process Study, supported by the National Science Foundation (NSF); Forced Upper Ocean Dynamics, an Office of Naval Research (ONR) initiative; and shipboard and aircraft measurements supported by the National Aeronautics and Space Administration (NASA). The Expedition consisted of 17 cruises aboard the R/V Thomas Thompson, year-long moored deployments of five instrumented surface buoys and five sediment-trap arrays, aircraft overflights and satellite observations. Of the seventeen ship cruises, six were allocated to repeat process survey cruises, four to SeaSoar mapping cruises, six to mooring and benthic work, and a single calibration cruise which was essentially conducted in transit to the Arabian Sea.

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Program Information

U.S. Joint Global Ocean Flux Study (U.S. JGOFS)

Website: http://usjgofs.whoi.edu/

Coverage: Global

The United States Joint Global Ocean Flux Study was a national component of international JGOFS and an integral part of global climate change research.

The U.S. launched the Joint Global Ocean Flux Study (JGOFS) in the late 1980s to study the ocean carbon cycle. An ambitious goal was set to understand the controls on the concentrations and fluxes of carbon and associated nutrients in the ocean. A new field of ocean biogeochemistry emerged with an emphasis on quality measurements of carbon system parameters and interdisciplinary field studies of the biological, chemical and physical process which control the ocean carbon cycle. As we studied ocean biogeochemistry, we learned that our simple views of carbon uptake and transport were severely limited, and a new "wave" of ocean science was born. U.S. JGOFS has been supported primarily by the U.S. National Science Foundation in collaboration with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Department of Energy and the Office of Naval Research. U.S. JGOFS, ended in 2005 with the conclusion of the Synthesis and Modeling Project (SMP).

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Funding

Funding Source	Award
National Science Foundation (NSF)	unknown Arabian Sea NSF

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