Iodine speciation from R/V Thomas G. Thompson TT045 cruise in the Arabian Sea in 1995 (U.S. JGOFS Arabian Sea project)

Website: https://www.bco-dmo.org/dataset/2552
Version: April 15, 1997
Version Date: 1997-04-15

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

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

Contributors	Affiliation	Role
Luther, George W.	University of Delaware	Principal Investigator
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Dataset Description

Iodine speciation

Methods & Sampling

PI: George Luther and Brent Lewis
of: University of Delaware
dataset: Iodine speciation
dates: March 15, 1995 to April 06, 1995
location: N: 22.4858 S: 10.8153 W: 58.0077 E: 68.7302
cruise: TN045, Arabian Sea Process cruise #2 (Spring Intermonsoon)
ship: R/V Thomas Thompson

COLLECTION
Samples were collected from routine hydrocasts and 0.45 micron (Gelman Supor membrane) filtered prior to analyses. Care was taken to draw samples after the dissolved oxygen reagents were removed from the hydrolab to avoid any potential sources of contamination during sampling.

Data Processing Description

Iodide methodology, Luther, Lewis

Iodide, total iodine

ANALYSES
Iodide and iodate concentrations were determined using polarographic and voltammetric methods.
Iodide (I-) was measured using cathodic stripping square wave voltammetry (CSSWV) [Luther et. al., 1988].

Iodate (IO3-) was measured using differential pulse polarography (DPP) [Herring and Liss, 1974].

Total iodine (...Ired) was measured using CSSWV [Campos (in press)].

Total iodine (...Iox) was measured using method of Takayanagi and Wong, 1986 following sample oxidation with 0.2% NaOCl.

The instrument minimum detection limits in seawater for I-, IO3-, ...Iox and ...Ired using polarography are 0.2, 20, 20, and 5 nM respectively. Total iodine methodologies gave statistically equivalent values and are therefore simply reported as Tot_I.

For detailed comparisons please consult (Farrenkopf,1997 -- Dissertation University of Delaware).

Precision for iodide based upon triplicate measurements of individual samples is within 5-10% in samples greater than 200 nM and within 1-2% for iodide concentrations less than 200 nM. Method precisions in 3.5% NaCl were +/- 1%. Precisions for the total methods tend to vary significantly from sample to sample and so reported errors "stdev Tot_I" reflect the standard deviation of at least three replicates with three distinct standard addition curves (n>3).

EQUIPMENT
Electrochemical measurements were made in 10 mL glass polarographic cells. EG & G Princeton Applied Research model 384 B polarographic analyzers equipped with 303A hanging mercury drop working electrode (HDME) stands were used throughout. Potentials were measured vs. a saturated calomel reference electrode (SCE). A platinum counter electrode was used for current measurements in a standard three electrode voltammetric arrangement. Iodide gives rise to a peak at a potential of -0.306 V, and iodate has a peak potential of -1.08 V. Aboard ship 10.0 mL aliquots of sample were dispensed into glass voltammetric cells and purged of dissolved oxygen with ultra pure nitrogen gas. The concentrations of iodine species were determined by the method of standard addition. A minimum of three standard additions were made for each determination. Tot_I measurements were also made with an Analytical Instrument Systems (AIS) DLK-100 with version 3.4 software equipped with a 303A hanging mercury drop working electrode (HDME) stand. The analyses on the DLK-100 were the same as with the 384B (Luther et al., 1988) with the exception that the frequency was 200 Hz (as compared to 100 Hz on the 384B).

References:

Campos, M.L.A. (in press) New approach to evaluating dissolved iodine speciation in natural waters using cathodic stripping voltammetry. Marine Chemistry

Luther, G. W., III, C. Branson Swartz and W.J. Ullman (1988) Direct determination of iodide in seawater by cathodic stripping square wave voltammetry. Analytical Chemistry. 60: 1721-1724.

Luther, G.W., III (1991) Sulfur and iodine speciation in the water column of the Black Sea, in Black Sea Oceanography, E. Izdar and J. W. Murray, Editors. Kluwer Publishers: Netherlands. p. 187-204.

Herring, J.R. and P.S. Liss (1974) A new method for the determination of iodine species in seawater. Deep-Sea Research I. 21: 777-783.

Farrenkopf, A.M., G.W. Luther, III, V.W. Truesdale and C.H. van der Weijden (in press) Sub-surface iodide maxima: Evidence for biologically catalyzed redox cycling in Arabian Sea OMZ during the SW intermonsoon. Deep-Sea Research.

Takayanagi, K. and G.T.F. Wong (1986) The oxidation of iodide to iodate for the polarographic determination of total iodine in natural waters. Talanta. 33(5): 451-454.

Theberge, S.M., III G.W. Luther and A.M. Farrenkopf (in press) On the existence of free and metal complexed sulfide in the Arabian Sea and it's Oxygen Minimum Zone. Deep-Sea Research.

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Data Files

File
iodine.csv (Comma Separated Values (.csv), 5.57 KB) MD5:023031b89ee360b0300e827a3374459d Primary data file for dataset ID 2552

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Parameters

Parameter	Description	Units
event	event number from event log	
sta_std	Arabian Sea standard station identifier	
sta	station number from event log	
cast	CTD cast number	
bot	CTD bottle number	
press	sample depth reported as pressure	decibars
iodide	concentration of iodide	nM
iodine_tot	concentration of total iodine	nM
iodine_tot_sd	standard deviation of total iodine	

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Instruments

Dataset-specific Instrument Name	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	CTD/Niskin Rosette bottles
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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Deployments

TT045

Website	https://www.bco-dmo.org/deployment/57706
Platform	R/V Thomas G. Thompson
Start Date	1995-03-14
End Date	1995-04-10

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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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