Sulfide; oxygen and peroxide; from CTD casts 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/2553
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

Sulfide; oxygen and peroxide; from CTD casts

Methods & Sampling

PI: George Luther and Brent Lewis
of: University of Delaware
dataset: Sulfide; peroxide ratio
dates: March 15, 1995 to March 29, 1995
location: N: 21.8328 S: 15.2382 W: 62.4017 E: 67.918
cruise: TN045, Arabian Sea Process cruise #2 (Spring Intermonsoon)
ship: R/V Thomas Thompson

Note: Zero values for sulfide represent less than the analytical detection limit of 0.2 nM.

Sulfide, Oxygen, and peroxide

COLLECTION
Samples for sulfide were measured aboard ship by voltammetry.
Sulfide samples were drawn anaerobically via syringe at the CTD
rosette from bottles not previously sampled for Winkler oxygen.
Samples were analyzed by voltammetry (both linear sweep and cathodic
stripping square wave) within ten minutes according to the methods of

Luther (1991). [also described in Farrenkopf et al., in press and Theberge et al., in press special Deep-Sea Research Arabian Sea Dutch volume.]

Data Processing Description

ANALYSES
Oxygen and peroxide can be determined without deposition by applying a negative potential scan from 0.0 V to -1.5 V using the linear sweep or square wave voltammetry. Oxygen and peroxide have peaks near -0.09 V and -0.95 V, respectively (Meites, 1965). After first scanning the samples in linear sweep mode to determine the ratio of oxygen to peroxide sulfide was determined by subsequent scans from -0.1 to -0.8 V in the cathodic stripping square wave voltammetry (CSSWV) mode without deposition. The analyses was repeated with up to 120 second deposition. There is approximately one minute time lag between measurement techniques. Depths chosen at each station coincided with levels of high iodide and/or high nitrite. Sulfide was not measureable at any of the stations for any of the depths sampled. Depths chosen at each station coincided with levels of high iodide and/or high nitrite. The method detection limit for sulfide in seawater samples is 0.2 nM. Measurements were undertaken to acertain that oxygen was present in the samples. Concentrations of oxygen and peroxide were not quantitated.

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. A blanket of nitrogen gas is maintained over the sample so oxygen will not dissolve into the sample from the laboratory atmosphere.

REFERENCES:

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.

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.

Meites (1965) Polarographic Techniques 2nd Edition. Inter Science Publications: New York, 752 pp.

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
sulfide_peroxide.csv(Comma Separated Values (.csv), 659 bytes) MD5:c2503addf23f090b313456282de39035 Primary data file for dataset ID 2553

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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
sulfide	concentration of sulfide	nM
H2O2_to_O2	peroxide to oxygen ratio	

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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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