Pigments, HPLC method, sampled from bottle casts from R/V Thomas G. Thompson TT043, TT045, TT049, TT050, TT053, TT054 cruises in the Arabian Sea in 1995 (U.S. JGOFS Arabian Sea project)

Website: https://www.bco-dmo.org/dataset/2533
Version: final
Version Date: 2002-04-09

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

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

Contributors	Affiliation	Role
Bidigare, Robert R.	University of Hawaii (UH)	Principal Investigator
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Dataset Description

Pigments, HPLC method, sampled from bottle casts

Methods & Sampling

See Platform deployments for cruise specific documentation

Data Processing Description

See Platform deployments for cruise specific documentation

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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 or TM cast number from event log	
bot	CTD or TM bottle number	
depth_n	nominal sample depth	meters
chlide_a	chlorophyllide a	nanogram/liter
chl_c3	chlorophyll c3	nanogram/liter
chl_c	sum of chl_c1, chl_c2 and Mg 3,8 divinyl-pheophorphyrin a5	nanogram/liter
peridinin	peridinin	nanogram/liter
fucox_but	19'-butanoyloxyfucoxanthin	nanogram/liter
fucox	fucoxanthin	nanogram/liter
fucox_hex	19'-hexanoyloxyfucoxanthin	nanogram/liter
violax	violaxanthin	nanogram/liter
diadinox	diadinoxanthin	nanogram/liter
allox	alloxanthin	nanogram/liter
diatox	diatoxanthin	nanogram/liter
zeax	zeaxanthin	nanogram/liter
carotene	sum of alpha and beta carotene	nanogram/liter
chl_b2	divinyl chlorophyll b	nanogram/liter
chl_b1	monovinyl chlorophyll b	nanogram/liter
chl_a2	divinyl chlorophyll a	nanogram/liter
chl_a1	monovinyl chlorophyll a	nanogram/liter
chl_b_tot	sum of chl_b1 and chl_b2	nanogram/liter
chl_a_tot	sum of chl_a1, chl_a2, chlide_a, chl_a1' and allomerized chla	nanogram/liter
neox	neoxanthin	nanogram/liter
chl_c4_1	phytolated chl_c type 1	nanogram/liter
chl_c4_2	phytolated chl_c type 2	nanogram/liter
pig_unid	pigments, sum of all major unidentified	nanogram/liter
cis_fucox	Cis-fucoxanthin	nanogram/liter
cis_hex	Cis-19'-hexanoyloxyfucoxanthin	nanogram/liter
prasinox	Prasinoxanthin	nanogram/liter
lutein	Lutein	nanogram/liter
carotene_a	alpha-carotene	nanogram/liter
carotene_b	beta-carotene	nanogram/liter
replicate	yes - indicates replicate measurements	
chlide_b	chlorophyllide b	nanogram/liter
chl_a1_prime	chlorophyll a1'	nanogram/liter

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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.

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: Ralf Goericke of: Scripps Institute of Oceanography dataset: Pigments, HPLC method, sampled from bottle casts dates: January 08, 1995 to February 01, 1995 location: N: 22.4835 S: 9.9826 W: 57.299 E: 68.75 cruise: TTN-043, Arabian Sea Process cruise 1 ship: R/V Thomas Thompson Methodology Goericke and Repeta (1993), Mar.Ecol.Prog.Ser., 101:307-313

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
Description	**Methods & Sampling** PI: Robert R. Bidigare of: University of Hawaii dataset: Pigments, HPLC method, sampled from bottle casts dates: March 14, 1995 to April 07, 1995 location: N: 22.4853 S: 9.9994 W: 57.3007 E: 68.7532 cruise: TTN-045, Arabian Sea Process cruise #2 (Spring Intermonsoon) ship: R/V Thomas Thompson **Processing Description** HPLC Pigment methods Method by Wright et al (Mar. Ecol. Prog. Ser. 1991, 77:183-196) CHLA1, CHLA2, CHLB1 and CHLB2 estimated following the method of Latasa et al (Mar. Chem. 1996, 51:315-324) Pigment data for P2 & P5: A comparison of the TURNER-determined chlorophyll a concentrations with the HPLC-determined TOTCHLA concentrations (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a; units = ng Chl a equivalents/L) was performed for Process Cruise #2 (TTN-045) and Process Cruise #5 (TTN-050). While good correlations were obtained for both cruises, the slope obtained for Process Cruise #5 was significantly different from 1 (i.e., TURNER > HPLC). This difference was probably caused by the presence of Chl a-related pigments during Process Cruise #5. Thus, we recommend that whenever possible use the HPLC pigment data and not the TURNER pigment data. If HPLC data is not available for a given cast, we further recommend that you use the following equations to transform the TURNER data into HPLC-equivalent concentrations (cf., Babin, M., A. Morel, H. Claustre, A. Bricaud, Z. Kolber and P.G. Falkowski. 1996. Nitrogen- and irradiance-dependent variations of the maximum quantum yield of carbon fixation in eutrophic, mesotrophic and oligotrophic marine systems. Deep-Sea Research, in press). Results of geometric mean regression analyses (reduced major axis): Y = HPLC TOTCHLA (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a), units = ng Chl a equivalents/L X = TURNER chlorophyll a (it is necessary to convert the Turner Chl a concentrations in the Arabian Sea data base from mg/m3 to ng/L by multiplying concentrations by 1000) (1) Process Cruise #2 (TTN-045) HPLC TOTCHLA = TURNER*(0.975) + 4.833 (r = 0.9822, n = 146) (2) Process Cruise #5 (TTN-050) HPLC TOTCHLA = TURNER*(0.708) + 12.881 (r = 0.9772, n = 575) Robert R. Bidigare Department of Oceanography University of Hawaii Honolulu, HI 96822 808-956-6567 (voice mail) 808-956-9516 (fax)

TT049

Website	https://www.bco-dmo.org/deployment/57710
Platform	R/V Thomas G. Thompson
Start Date	1995-07-17
End Date	1995-08-15
Description	**Methods & Sampling** PI: Ralf Goericke of: Scripps Institute of Oceanography dataset: Pigments, HPLC method, sampled from bottle casts dates: July 18, 1995 to August 13, 1995 location: N: 22.5001 S: 9.9258 W: 57.2997 E: 68.7507 cruise: TTN-049, Arabian Sea Process cruise 4 (Middle SW Monsoon) ship: R/V Thomas Thompson Methodology Goericke and Repeta (1993), Mar.Ecol.Prog.Ser., 101:307-313

TT050

Website	https://www.bco-dmo.org/deployment/57711
Platform	R/V Thomas G. Thompson
Start Date	1995-08-18
End Date	1995-09-15
Description	**Methods & Sampling** PI: Robert R. Bidigare of: University of Hawaii dataset: Pigments, HPLC method, sampled from bottle casts dates: August 18, 1995 to September 13, 1995 location: N: 22.4688 S: 9.9991 W: 57.3004 E: 68.7494 cruise: TTN-050, Arabian Sea Process cruise #5 (Late SW Monsoon) ship: R/V Thomas Thompson **Processing Description** HPLC Pigment methods Method by Wright et al (Mar. Ecol. Prog. Ser. 1991, 77:183-196) CHLA1, CHLA2, CHLB1 and CHLB2 estimated following the method of Latasa et al (Mar. Chem. 1996, 51:315-324) Pigment data for P2 & P5: A comparison of the TURNER-determined chlorophyll a concentrations with the HPLC-determined TOTCHLA concentrations (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a; units = ng Chl a equivalents/L) was performed for Process Cruise #2 (TTN-045) and Process Cruise #5 (TTN-050). While good correlations were obtained for both cruises, the slope obtained for Process Cruise #5 was significantly different from 1 (i.e., TURNER > HPLC). This difference was probably caused by the presence of Chl a-related pigments during Process Cruise #5. Thus, we recommend that whenever possible use the HPLC pigment data and not the TURNER pigment data. If HPLC data is not available for a given cast, we further recommend that you use the following equations to transform the TURNER data into HPLC-equivalent concentrations (cf., Babin, M., A. Morel, H. Claustre, A. Bricaud, Z. Kolber and P.G. Falkowski. 1996. Nitrogen- and irradiance-dependent variations of the maximum quantum yield of carbon fixation in eutrophic, mesotrophic and oligotrophic marine systems. Deep-Sea Research, in press). Results of geometric mean regression analyses (reduced major axis): Y = HPLC TOTCHLA (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a), units = ng Chl a equivalents/L X = TURNER chlorophyll a (it is necessary to convert the Turner Chl a concentrations in the Arabian Sea data base from mg/m3 to ng/L by multiplying concentrations by 1000) (1) Process Cruise #2 (TTN-045) HPLC TOTCHLA = TURNER*(0.975) + 4.833 (r = 0.9822, n = 146) (2) Process Cruise #5 (TTN-050) HPLC TOTCHLA = TURNER*(0.708) + 12.881 (r = 0.9772, n = 575) Robert R. Bidigare Department of Oceanography University of Hawaii Honolulu, HI 96822 808-956-6567 (voice mail) 808-956-9516 (fax)

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: Robert R. Bidigare of: University of Hawaii dataset: Pigments, HPLC method, sampled from bottle casts dates: October 29, 1995 to November 25, 1995 location: N: 24.3302 S: 10.0823 W: 56.4858 E: 67.1666 cruise: TTN-053, Arabian Sea Process cruise #6 (bio-optics) ship: R/V Thomas Thompson **Processing Description** HPLC Pigment methods - Process 6 Robert Bidigare University of Hawaii References: 1. Wright et al (Mar. Ecol. Prog. Ser. 1991, 77:183-196) 2. Latasa et al (Mar. Chem. 1996, 51:315-324) - estimates of chl_a1, chl_a2, chl_b1 and chl_b2 Methodology notes for the P6 pigment data: I) A comparison of the TURNER-determined chlorophyll a concentrations with the HPLC-determined TOTCHLA concentrations (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a; units = ng Chl a equivalents/L) was performed for Process Cruise #6 (TTN-053). While a slope of approximately of 1 was obtained (see below), there was a significant amount of scatter in the cross-plot (r = 0.938). This scatter was probably caused in part by the variable presence of Chl accessory pigments which interfere with the fluorometric method. Thus, we recommend that whenever possible use the HPLC pigment data and not the TURNER pigment data. If HPLC data is not available for a given cast, we further recommend that you use the following equation to transform the TURNER data into HPLC-equivalent concentrations (cf., Babin, M., A. Morel, H. Claustre, A. Bricaud, Z. Kolber and P.G. Falkowski. 1996. Nitrogen- and irradiance-dependent variations of the maximum quantum yield of carbon fixation in eutrophic, mesotrophic and oligotrophic marine systems. Deep-Sea Research, in press). Results of geometric mean regression analyses (reduced major axis): Y = HPLC TOTCHLA (monovinyl chlorophyll a + divinyl chlorophyll a + monovinyl chlorophyllide a), units = ng Chl a equivalents/L X = TURNER chlorophyll a (it is necessary to convert the Turner Chl a concentrations in the Arabian Sea data base from mg/m3 to ng/L by multiplying concentrations by 1000) Process Cruise #6 (TTN-053) HPLC TOTCHLA = TURNER*(1.052) - 56.474 (r = 0.938, n = 479) II) Accessory pigment quantification (1) Although most pigment peaks were clearly identifiable based on retention time, a few of the minor pigments presented difficulties. The presence of lutein, in particular, was difficult to determine unambiguously. Lutein concentrations are therefore specified only where that peak is clearly evident, although it may be present in trace quantities in other samples as well. (2) The peak identified as alloxanthin agreed very well with a concurrently run standard for approximately the first half of the samples run. However, in samples run later, what appears to be the same peak does not agree well with the known alloxanthin retention time. Since samples were run in random order and because there is no particular reason for the sudden absence of the pigment, we continued to identify this peak as alloxanthin throughout the remainder of the data set. The appearance of the peak as a doublet in some instances suggests the possibility of pigment alteration (e.g., a trans to cis isomerization). The change in agreement between sample and standard alloxanthin peaks also corresponds with a change in the HPLC column, though this does not appear to have affected the comparability of other peaks with their standards. (3) Chlorophyll b occasionally appeared as a split peak, or with a very close shoulder on the main peak (either leading or trailing). This may have resulted from either a partial separation of monovinyl and divinyl chlorophyll b, or from the coelution of some other pigment with chlorophyll b. In all cases where this occurred, both peaks (or peak with shoulder) were included in the area used to calculate chlorophyll b concentrations.

TT054

Website	https://www.bco-dmo.org/deployment/57715
Platform	R/V Thomas G. Thompson
Start Date	1995-11-30
End Date	1995-12-28
Description	**Methods & Sampling** PI: Ralf Goericke of: University of California, San Diego dataset: Pigments, HPLC method, sampled from bottle casts dates: November 30, 1995 to December 26, 1995 location: N: 22.5171 S: 9.9789 W: 57.2992 E: 68.7849 project/cruise: Arabian Sea/TTN-054, Process cruise 7 (Early NE Monsoon) ship: R/V Thomas Thompson Methodology Goericke and Repeta (1993), Mar.Ecol.Prog.Ser., 101:307-313

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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
National Aeronautics & Space Administration (NASA)	unknown Arabian Sea NASA

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