Bio Optical Profiler data from R/V Thomas G. Thompson cruises TT007, TT008, TT011, TT012 in the Equatorial Pacific in 1992 during the U.S. JGOFS Equatorial Pacific (EqPac) project

Website: https://www.bco-dmo.org/dataset/2664
Version: final
Version Date: 1995-06-16

Project
» U.S. JGOFS Equatorial Pacific (EqPac)

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

Contributors	Affiliation	Role
Davis, Curtiss	Naval Research Laboratory	Principal Investigator
Trees, Charles C.	San Diego State University (SDSU)	Principal Investigator
Chandler, Cynthia L.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

Bio Optical Profiler Data

Methods & Sampling

See Platform deployments for cruise specific documentation

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Parameters

Parameter	Description	Units
event	event/operation number from event log	
sta	station number fro event log	
cast	optical profile cast number	
cast_type	either upcast or downcast	
lat	latitude, negative = south	decimal degrees
lon	longitude, negative = west	decimal degrees
depth	depth_of_observation	meters

Es_n456	spectral irradiance above sea su wave length of 456nm	uW/cm^2nm^-1*10^-3
Es_n488	spectral irradiance above sea su wave length of 488nm	uW/cm^2nm^-1*10^-3
Es_n532	spectral irradiance above sea su wave length of 532nm	uW/cm^2nm^-1*10^-3
Es_n670	spectral irradiance above sea su wave length of 670nm	uW/cm^2nm^-1*10^-3
Kd_452	diffuse attenuation coefficient for Ed 452	m^-1*10^-4
Ed_452	downwelled irradiance at wave length of 452	uW/cm^2nm^-1*10^-4
Kd_440	diffuse attenuation coefficient for Ed 440	m^-1*10^-4
Ed_440	downwelled irradiance at wave length of 440	uW/cm^2nm^-1*10^-4
Kd_486	diffuse attenuation coefficient for Ed 486	m^-1*10^-4
Ed_486	downwelled irradiance at wave length of 486	uW/cm^2nm^-1*10^-4
Kd_519	diffuse attenuation coefficient for Ed 519	m^-1*10^-4
Ed_519	downwelled irradiance at wave length of 519	uW/cm^2nm^-1*10^-4
Kd_530	diffuse attenuation coefficient for Ed 530	m^-1*10^-4
Ed_530	downwelled irradiance at wave length of 530	uW/cm^2nm^-1*10^-4
Kd_548	diffuse attenuation coefficient for Ed 548	m^-1*10^-4
Ed_548	downwelled irradiance at wave length of 548	uW/cm^2nm^-1*10^-4
Kd_589	diffuse attenuation coefficient for Ed 589	m^-1*10^-4
Ed_589	downwelled irradiance at wave length of 589	uW/cm^2nm^-1*10^-4
Kd_632	diffuse attenuation coefficient for Ed 632	m^-1*10^-4
Ed_632	downwelled irradiance at wave length of 632	uW/cm^2nm^-1*10^-4
Kd_655	diffuse attenuation coefficient for Ed 655	m^-1*10^-4
Ed_655	downwelled irradiance at wave length of 655	uW/cm^2nm^-1*10^-4
Kd_670	diffuse attenuation coefficient for Ed 670	m^-1*10^-4
Ed_670	downwelled irradiance at wave length of 670	uW/cm^2nm^-1*10^-4
Kd_696	diffuse attenuation coefficient for Ed 696	m^-1*10^-4
Ed_696	downwelled irradiance at wave length of 696	uW/cm^2nm^-1*10^-4
K_par	diffuse attenuation coefficient for E par	m^-1*10^-4
E_par	underwater photosynthetically available radiation	uE/m^2/sec*10^-4
Ku_439	diffuse attenuation coefficient for Eu 439	m^-1*10^-4
Eu_439	upwelled irradiance at wave length of 439	uW/cm^2nm^-1*10^-4
Ku_453	diffuse attenuation coefficient for Eu 453	m^-1*10^-4
Eu_453	upwelled irradiance at wave length of 453	uW/cm^2nm^-1*10^-4
Ku_486	diffuse attenuation coefficient for Eu 486	m^-1*10^-4
Eu_486	upwelled irradiance at wave length of 486	uW/cm^2nm^-1*10^-4
Ku_529	diffuse attenuation coefficient for Eu 529	um^-1*10^-4
Eu_529	upwelled irradiance at wave length of 529	uW/cm^2nm^-1*10^-4
Ku_549	diffuse attenuation coefficient for Eu 549	m^-1*10^-4
Eu_549	upwelled irradiance at wave length of 549	uW/cm^2nm^-1*10^-4
Ku_589	diffuse attenuation coefficient for Eu 589	m^-1*10^-4
Eu_589	upwelled irradiance at wave length of 589	uW/cm^2nm^-1*10^-4
Ku_632	diffuse attenuation coefficient for Eu 632	m^-1*10^-4

Eu_632	upwelled irradiance at wave length of 632	uW/cm^2nm^-1*10^-4
Ku_670	diffuse attenuation coefficient for	Eu 670
Eu_670	upwelled irradiance at wave length of 670	uW/cm^2nm^-1*10^-4
Kl_442	diffuse attenuation coefficient for Lu 442	m^-1*10^-4
Lu_442	upwelled radiance at wave length of 442	uW/cm^2nm^-1sr^-1*10^-5
Kl_456	diffuse attenuation coefficient for Lu 456	m^-1*10^-4
Lu_456	upwelled radiance at wave length of 456	uW/cm^2nm^-1sr^-1*10^-5
Kl_489	diffuse attenuation coefficient for Lu 489	m^-1*10^-4
Lu_489	upwelled radiance at wave length of 489	uW/cm^2nm^-1sr^-1*10^-5
Kl_531	diffuse attenuation coefficient for Lu 531	m^-1*10^-4
Lu_531	upwelled radiance at wave length of 531	uW/cm^2nm^-1sr^-1*10^-5
Kl_550	diffuse attenuation coefficient for Lu 550	m^-1*10^-4
Lu_550	upwelled radiance at wave length of 550	uW/cm^2nm^-1sr^-1*10^-5
Kl_590	diffuse attenuation coefficient for Lu 590	m^-1*10^-4
Lu_590	upwelled radiance at wave length of 590	uW/cm^2nm^-1sr^-1*10^-5
Kl_711	diffuse attenuation coefficient for Lu 711	m^-1*10^-4
Lu_711	upwelled radiance at wave length of 711	uW/cm^2nm^-1sr^-1*10^-5
temp	CTD derived water temperature	millidegrees C
beam	particle beam attenuation coefficient	meters
fluor	chlorophyll-a fluorescence	millivolts
year	year as YY	
mon	month as MM	
day	day as DD	
time	time in local hours and minutes	
comment	sky conditions etc.	
pts_per_meter	number of original points per one meter bin	count
tilt	instrument tilt	degrees range -45 to 45
roll	instrument roll	degrees range -45 to 45
sal	CTD salinity calculated from conductivity	PPT
cond	CTD conductivity	
sigma	calculated density	
paruw	downwelling scalar PAR at depth	E17 quanta/sec/cm^2
ed_410	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_441	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_488	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_520	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_550	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_560	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_633	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_656	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_671	downwelling spectral irradiance at depth	uW/cm^2/nm

ed_683	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_694	downwelling spectral irradiance at depth	uW/cm^2/nm
ed_710	downwelling spectral irradiance at depth	uW/cm^2/nm
eu_410	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_441	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_488	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_520	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_550	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_671	upwelling spectral irradiance at depth	uW/cm^2/nm
eu_694	upwelling spectral irradiance at depth	uW/cm^2/nm
lu_410	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_441	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_488	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_520	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_633	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_656	upwelling spectral radiance at depth	uW/cm^2/nm/str
lu_683	upwelling spectral radiance at depth	uW/cm^2/nm/str
e_410	spectral irradiance above sea surface	uW/cm^2/nm
e_520	spectral irradiance above sea surface	uW/cm^2/nm
e_589	spectral irradiance above sea surface	uW/cm^2/nm
e_683	spectral irradiance above sea surface	uW/cm^2/nm
Kd_518	diffuse attenuation coefficient for Ed_519	m^-1*10^-4
Ed_518	downwelled irradiance at wave length of 519	uW/cm^2nm^-1*10^-4
Kd_669	diffuse attenuation coefficient for Ed_670	m^-1*10^-4
Ed_669	downwelled irradiance at wave length of 670	uW/cm^2nm^-1*10^-4
Kl_455	diffuse attenuation coefficient for Lu_456	m^-1*10^-4
Lu_455	upwelled radiance at wave length of 456	uW/cm^2nm^-1sr^-1*10^-5
Kl_591	diffuse attenuation coefficient for Lu_590	m^-1*10^-4
Lu_591	upwelled radiance at wave length of 590	uW/cm^2nm^-1sr^-1*10^-5
Kl_685	diffuse attenuation coefficient for Lu_685	m^-1*10^-4
Lu_685	upwelled radiance at wave length of 685	uW/cm^2nm^-1sr^-1*10^-5

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Instruments

Dataset-specific Instrument Name	Bio-Optical Profiling System
Generic Instrument Name	Bio-Optical Profiling System
Generic Instrument Description	Bio-Optical Profiling System (BOPS) is an updated version of the BOPS originally developed by Smith et al. (1984) and is used to collect optical data. The heart of the BOPS is a Biospherical instruments MER-1048 Spectroradiometer which measures up and downwelling spectral irradiance and upwelling spectral radiance. The MER-1048 also has sensors for Photosynthetically Available Radiation (PAR), depth, tilt and roll. In addition, temperature and conductivity are measured with a Sea-Bird CTD, chlorophyll fluorescence is measured with a Sea Tech fluorometer and beam transmission with a Sea Tech 25-cm transmissometer. The Mer-1048 acquires all the data 16 times a second, averages it to four records a second and sends it up the cable to a deck box and a Compaq-286 computer which stores the data on the hard disk. Additionally, a deck cell measures the downwelling surface irradiance in four spectral channels. Also surface PAR is measured continuously using a Biospherical Instruments QSR-240 Integrating PAR sensor. The profile data is commonly filtered to remove obvious data spikes and then binned into one-meter averages. Raymond C. Smith, Charles R. Booth, and Jeffrey L. Star, "Oceanographic biooptical profiling system," Appl. Opt. 23, 2791-2797 (1984).

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Deployments

TT007

Website	https://www.bco-dmo.org/deployment/57728
Platform	R/V Thomas G. Thompson
Start Date	1992-01-30
End Date	1992-03-13
Description	Purpose: Spring Survey Cruise; 12°N-12°S at 140°W TT007 was one of five cruises conducted in 1992 in support of the U.S. Equatorial Pacific (EqPac) Process Study. The five EqPac cruises aboard R/V Thomas G. Thompson included two repeat meridional sections (12°N - 12°S), 2 equatorial surveys, and a benthic survey (all at 140° W). The scientific objectives of this study were to observe the processes in the Equatorial Pacific controlling the fluxes of carbon and related elements between the atmosphere, euphotic zone, and deep ocean. As luck would have it, the survey window coincided with an El Nino event. A bonus for the research team. **Methods & Sampling** PI: Chuck Trees of: San Diego State University dataset: Bio Optical Profiler Data dates: February 04, 1992 to March 08, 1992 location: N: 12.0147 S: -12.0293 W: -140.434 E: -134.9978 project/cruise: EQPAC/TT007 - Spring Survey ship: Thomas Thompson note: Surface irradiance (Es_n) wave lengths are only relative values and should not be used as absolute values. These data are used for internal processing of the radiometric data. EqPac Protocol 24

TT008

Website	https://www.bco-dmo.org/deployment/57729
Platform	R/V Thomas G. Thompson
Start Date	1992-03-19
End Date	1992-04-15
Description	Purpose: Spring Time Series; Equator, 140°W TT008 was one of five cruises conducted in 1992 in support of the U.S. Equatorial Pacific (EqPac) Process Study. The five EqPac cruises aboard R/V Thomas G. Thompson included two repeat meridional sections (12°N - 12°S), 2 equatorial surveys, and a benthic survey (all at 140° W). The scientific objectives of this study were to observe the processes in the Equatorial Pacific controlling the fluxes of carbon and related elements between the atmosphere, euphotic zone, and deep ocean. As luck would have it, the survey window coincided with an El Nino event. A bonus for the research team. **Methods & Sampling** PI: Curt Davis of: Naval Research Laboratory dataset: Bio-Optical Profiler Data dates: March 25, 1992 to April 14, 1992 location: N: 9.0012 S: -0.0365 W: -140.029 E: -139.859 project/cruise: EQPAC/TT008 - Spring time Series ship: Thomas Thompson PI-Notes EqPac Protocol 24

TT011

Website	https://www.bco-dmo.org/deployment/57730
Platform	R/V Thomas G. Thompson
Start Date	1992-08-05
End Date	1992-09-18
Description	Purpose: Fall Survey; 12°N-12°S at 140°W TT011 was one of five cruises conducted in 1992 in support of the U.S. Equatorial Pacific (EqPac) Process Study. The five EqPac cruises aboard R/V Thomas G. Thompson included two repeat meridional sections (12°N - 12°S), 2 equatorial surveys, and a benthic survey (all at 140° W). The scientific objectives of this study were to observe the processes in the Equatorial Pacific controlling the fluxes of carbon and related elements between the atmosphere, euphotic zone, and deep ocean. As luck would have it, the survey window coincided with an El Nino event. A bonus for the research team. **Methods & Sampling** PI: Chuck Trees of: San Diego State University dataset: Bio-Optical Profiler Data dates: August 10, 1992 to September 13, 1992 location: N: 12.0033 S: -11.9217 W: -140.84 E: -134.9467 project/cruise: EQPAC/TT011 - Fall Survey ship: Thomas Thompson PI-Notes: Surface irradiance (Es_n) wave lengths are only relative values and should not be used as absolute values. These data are used for internal processing of the radiometric data. EqPac Protocol 24

TT012

Website	https://www.bco-dmo.org/deployment/57731
Platform	R/V Thomas G. Thompson
Start Date	1992-09-24
End Date	1992-10-21
Description	Purpose: Fall Time Series; Equator, 140°W TT012 was one of five cruises conducted in 1992 in support of the U.S. Equatorial Pacific (EqPac) Process Study. The five EqPac cruises aboard R/V Thomas G. Thompson included two repeat meridional sections (12°N - 12°S), 2 equatorial surveys, and a benthic survey (all at 140° W). The scientific objectives of this study were to observe the processes in the Equatorial Pacific controlling the fluxes of carbon and related elements between the atmosphere, euphotic zone, and deep ocean. As luck would have it, the survey window coincided with an El Nino event. A bonus for the research team. **Methods & Sampling** PI: Curt Davis of: Naval Research Laboratory dataset: Bio-Optical Profiler Data dates: September 26, 1992 to October 21, 1992 location: N: 0.0645 S: -11.9958 W: -145.3995 E: -139.8992 project/cruise: EQPAC/TT012 - Fall Time Series ship: Thomas Thompson PI-Notes EqPac Protocol 24

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Project Information

U.S. JGOFS Equatorial Pacific (EqPac)

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

Coverage: Equatorial Pacific

The U.S. EqPac process study consisted of repeat meridional sections (12°N -12°S) across the equator in the central and eastern equatorial Pacific from 95°W to 170°W during 1992. The major scientific program was focused at 140° W consisting of two meridional surveys, two equatorial surveys, and a benthic survey aboard the R/V Thomas Thompson. Long-term deployments of current meter and sediment trap arrays augmented the survey cruises. NOAA conducted boreal spring and fall sections east and west of 140°W from the R/V Baldridge and R/V Discoverer. Meteorological and sea surface observations were obtained from NOAA's in place TOGA-TAO buoy network.

The scientific objectives of this study were to determine the fluxes of carbon and related elements, and the processes controlling these fluxes between the Equatorial Pacific euphotic zone and the atmosphere and deep ocean. A broad overview of the program at the 140°W site is given by Murray et al. (Oceanography, 5: 134-142, 1992). A full description of the Equatorial Pacific Process Study, including the international context and the scientific results, appears in a series of Deep-Sea Research Part II special volumes:

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific (1995), Deep-Sea Research Part II, Volume 42, No. 2/3.

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific. Part 2 (1996), Deep-Sea Research Part II, Volume 43, No. 4/6.

Topical Studies in Oceanography, A U.S. JGOFS Process Study in the Equatorial Pacific (1997), Deep-Sea Research Part II, Volume 44, No. 9/10.

Topical Studies in Oceanography, The Equatorial Pacific JGOFS Synthesis (2002), Deep-Sea Research Part II, Volume 49, Nos. 13/14.

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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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