

Merged bottle and nutrient 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/2652>

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Project

» [U.S. JGOFS Equatorial Pacific](#) (EqPac)

Program

» [U.S. Joint Global Ocean Flux Study](#) (U.S. JGOFS)

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Dataset Description

Merged bottle and nutrient data

Methods & Sampling

See Platform deployments for cruise specific documentation

Data Processing Description

EQPAC Survey Cruises TT007 and TT011 Nutrient Data QA/QC report.

C. Garside and J.C.Garside

Bigelow Laboratory for Ocean Sciences - June 1993

The methods and data analysis employed were those described in Garside, 1993 (submitted before the first EQPAC cruises). The following describes specific details of the QA/QC procedure.

During each cruise all profiles for each station were overlaid and compared for consistency. On TT011 profiles were also overlaid on TT007 data for comparison. Some early standards during TT007 were identified as being low and their concentrations were resolved by reconstruction of standard provenance post cruise.

Post cruise reprocessing of the data was done in conjunction with comparisons of the results with concurrent CTD data from the shipboard CTD mark files and historical nutrient data sets (CATO Expedition, Craig et al., 1981 (GEOSECS); G. Heimerdinger (NODC), pers. comm.; Marumo (Hakuho Maru Cruise KH-69-4, IBP)).

ASW offsets were determined for each chemistry on every run. These values were used to assign a single ASW offset for each chemistry for each batch of ASW.

Carryover between samples was determined in each analytical run for each chemistry using the transition from the first to second standard and from the fourth standard to baseline. These corrections were built into the data reduction software.

Post cruise checking of the CFA system revealed non-linearity in the nitrate and (later) the silicate chemistries during TT007, which were not detected during TT007 because of low standard concentrations. The non-linearity was quantified and a correction applied.

Once nutrient data had been corrected and similar profiles were obtained for each station, nutrient versus sigma_t plots were prepared; we expected these relationships to be tight even if individual cast profiles at the same station differed because of internal wave and spatial variability. Generally these relationships were good, with some surprising outliers not evident in the profiles. The outliers seem to be attributable to problems in the CTD records and to mis-trips. Nutrient data have been nulled out only if they are inconsistent with the general depth profile for the station and inconsistent in the nutrient density plots for the station and analytical problems could be identified from the CFA records. Final QA/QC of these data will require further effort in developing reliable bottle CTD data at workshops during the latter half of 1993. For this reason nutrient data have been archived referenced to station, CTD number and bottle number.

References

- CATO Expedition Data Report, 1990. Physical, Chemical and Biological Data - CATO Expedition. SIO Reference 90-4, University of California, Scripps Institution of Oceanography, La Jolla, CA 92093.
- Craig, H, W. S. Broecker and D. Spencer. 1981. GEOSECS Pacific Expedition, Volume 4 Sections and Profiles. IDOE/NSF, US Government Printing Office, Washington D.C. 20402.
- Garside, C. 1993. Nutrient Protocols. in U.S. JGOFS Equatorial Pacific Process Study Sampling and Analytical Protocols. eds. S. Kadar, M. Leinen and J.W. Murray. USJGOFS Planning and Coordination Office, WHOI, Woods Hole, MA 02543.
- G. Heimerdinger pers. comm, NODC Archive 5oN - 5oS, 130oW - 150oW nutrient data set.
- Marumo, R, et al., 1970. Preliminary Report of the Hakuho Maru Cruise KH-69-4 (IBP Cruise). ed. Marumo. R. Ocean Research Institute, University of Tokyo.

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Parameters

Parameter	Description	Units
event	event/operation number from event log	dimensionless
sta	station number of CTD and bottle cast	dimensionless
cast	cast number of CTD bottle cast event	dimensionless
lat	latitude (negative for south)	decimal degrees
lon	longitude (negative for west)	decimal degrees
year_date	date as a decimal year	dimensionless
q_code	set by J. Murray, x identifies problems with the data quality reported at that level(mis-trips, suspect salinity, etc) See 'PI-Notes on Quality' link.	dimensionless
bot	ctd rosette bottle number	dimensionless
depth	sample depth reported as meters	meters
press	sample depth reported as pressure	decibars
temp_ctd	ctd temperature	degrees Celsius
sal_ctd	ctd salinity	ppt
sigma_t_ctd	ctd sigma-t	kilograms/meter ³
potemp_ctd	ctd potential temperature	degrees Celsius
sigma_0_ctd	ctd potential density	kilograms/meter ³
O2_bot	dissolved oxygen (Winkler)	milliliters/liter
sal_bot	bottle salinity	ppt
NH4	ammonium	micromoles/liter
NO3	nitrate	micromoles/liter
NO2	nitrite	micromoles/liter
PO4	phosphate	micromoles/liter
SiO4	silicate	micromoles/liter
urea	urea	micromoles/liter
chl_a	chlorophyll-a	micrograms/liter
phaeo	total phaeopigments	micrograms/liter
Fo_to_Fa	ratio of fluorometer reading before acidification (Fo) to fluorometer reading after acidification (Fa)	ratio
temp_draw	temperature of the seawater drawn from each Niskin (used to convert O2_bot to O2 in umol/kg)	degrees Celsius
O2	dissolved oxygen concentration of seawater	micromoles O2/kilogram

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Instruments

Dataset-specific Instrument Name	Niskin Bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	CTD clean rosette (Niskin) bottles were used to collect water samples.
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

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	<p>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.</p> <p>Methods & Sampling PI: (1) Jim Murray and (2) Chris Garside of: (1) University of Washington (2) Bigelow Laboratory dataset: Merged bottle and nutrient data dates: February 03, 1992 to March 09, 1992 location: N: 12.0674 S: -12.2083 W: -140.7692 E: -134.3131 project/cruise: EQPAC/TT007 - Spring Survey ship: Thomas Thompson PI-Notes on Quality (Murray) PI-Notes on Quality Procedure (Garside) PI-Notes on NO3 vs. T/S misfits (Garside)</p> <p>Processing Description EQPAC Survey Cruises TT007 and TT011 Nutrient Data QA/QC report. C. Garside and J.C.Garside Bigelow Laboratory for Ocean Sciences - June 1993 The methods and data analysis employed were those described in Garside, 1993 (submitted before the first EQPAC cruises). The following describes specific details of the QA/QC procedure. During each cruise all profiles for each station were overlaid and compared for consistency. On TT011 profiles were also overlaid on TT007 data for comparison. Some early standards during TT007 were identified as being low and their concentrations were resolved by reconstruction of standard provenance post cruise. Post cruise reprocessing of the data was done in conjunction with comparisons of the results with concurrent CTD data from the shipboard CTD mark files and historical nutrient data sets (CATO Expedition, Craig et al., 1981 (GEOSECS); G. Heimerdinger (NODC), pers. comm.; Marumo (Hakuho Maru Cruise KH-69-4, IBP)). ASW offsets were determined for each chemistry on every run. These values were used to assign a single ASW offset for each chemistry for each batch of ASW. Carryover between samples was determined in each analytical run for each chemistry using the transition from the first to second standard and from the fourth standard to baseline. These corrections were built into the data reduction software. Post cruise checking of the CFA system revealed non-linearity in the nitrate and (later) the silicate chemistries during TT007, which were not detected during TT007 because of low standard concentrations. The non- linearity was quantified and a correction applied. Once nutrient data had been corrected and similar profiles were obtained for each station, nutrient versus sigma-t plots were prepared; we expected these relationships to be tight even if individual cast profiles at the same station differed because of internal wave and spatial variability. Generally these relationships were good, with some surprising outliers not evident in the profiles. The outliers seem to be attributable to problems in the CTD records and to mis-trips. Nutrient data have been nulled out only if they are inconsistent with the general depth profile for the station and inconsistent in the nutrient density plots for the station and analytical problems could be identified from the CFA records. Final QA/QC of these data will require further effort in developing reliable bottle CTD data at workshops during the latter half of 1993. For this reason nutrient data have been archived referenced to station, CTD number and bottle number. References CATO Expedition Data Report, 1990. Physical, Chemical and Biological Data - CATO Expedition. SIO Reference 90-4, University of California, Scripps Institution of Oceanography, La Jolla, CA 92093. Craig, H, W. S. Broecker and D. Spencer. 1981. GEOSECS Pacific Expedition, Volume 4 Sections and Profiles. IDOE/NSF, US Government Printing Office, Washington D.C. 20402. Garside, C. 1993. Nutrient Protocols. in U.S. JGOFS Equatorial Pacific Process Study Sampling and Analytical Protocols. eds. S. Kadar, M. Leinen and J.W. Murray. USJGOFS Planning and Coordination Office, WHOI, Woods Hole, MA 02543. G. Heimerdinger pers. comm, NODC Archive 5oN - 5oS, 130oW - 150oW nutrient data set. Marumo, R, et al., 1970. Preliminary Report of the Hakuho Maru Cruise KH-69-4 (IBP Cruise). ed. Marumo. R. Ocean Research Institute, University of Tokyo.</p>
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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	<p>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.</p> <p>Methods & Sampling PI: Jim Murray and Pat Wheeler of: University of Washington and Oregon State University dataset: Merged bottle and nutrient data dates: March 19, 1992 to April 14, 1992 location: N: 9.0905 S: -8.7858 W: -143.0025 E: -139.8528 project/cruise: EQPAC/TT008 - Spring Time Series ship: Thomas Thompson PI-Notes on Quality (Murray)</p>

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	<p>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.</p> <p>Methods & Sampling PI: Jim Murray and Chris Garside of: University of Washington and Bigelow Laboratory dataset: Merged bottle and nutrient data dates: August 10, 1992 to September 15, 1992 location: N: 12.0317 S: -11.9767 W: -141.4467 E: -134.9117 project/cruise: EQPAC/TT011 - Fall Survey ship: Thomas Thompson PI-Notes on Quality (Murray) PI-Notes on Quality Procedure (Garside) PI-Notes on NO3 vs. T/S misfits (Garside)</p>

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	<p>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.</p> <p>Methods & Sampling PI: Jim Murray and Pat Wheeler of: University of Washington and Oregon State University dataset: Merged bottle and nutrient data dates: September 25, 1992 to October 21, 1992 location: N: 0.079 S: -12 W: -145.489 E: -139.8587 cruise: EQPAC/TT012 - Fall Time Series ship: Thomas Thompson PI-Notes on Quality (Murray) PI-Notes (Wheeler) PI-Notes (Merged Data)</p>

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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 Baldrige 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.

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).