

# Processed hydrography data collected using the ship's CTD package during the Metzyme cruise (R/V Kilo Moana KM1128) in the tropical North Pacific in October 2011

**Website:** <https://www.bco-dmo.org/dataset/716469>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2017-10-09

## Project

» [Connecting Trace Elements and Metalloenzymes Across Marine Biogeochemical Gradients \(GPc03\)](#)  
(MetZyme)

## Program

» [U.S. GEOTRACES](#) (U.S. GEOTRACES)

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## Abstract

Processed hydrography data collected using the ship's CTD package during the Metzyme cruise (R/V Kilo Moana KM1128) in the tropical North Pacific in October 2011.

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## Coverage

**Spatial Extent:** N:17 E:-154.4 S:-15 W:-173.1

**Temporal Extent:** 2011-10-01 - 2011-10-25

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## Dataset Description

Processed hydrography data from Metzyme cruise (KM1128) collected using the ship's CTD packages.

These data were published in:

Santoro, A.E., Saito, M.A., Goepfert, T.J., Lamborg, C.H., Dupont, C.L., and G.R. DiTullio. 2017. Thaumarchaeal ecotype distributions across the equatorial Pacific Ocean and their potential roles in nitrification and sinking flux attenuation. *Limnology & Oceanography*. doi:[10.1002/lno.10547](https://doi.org/10.1002/lno.10547)

## Methods & Sampling

Data were collected using the ship's CTD package (SBE911+). Note that the ship's first CTD, used at Station 1, was lost at station 2. A second CTD package was later obtained and used at stations 5-12. (Refer to the 'Problem Report' below for more information.)

Also note that a second CTD package (Trace Metal Rosette (TMR), SEACAT 19+) was also used for sampling at some stations. See the "TMR Hydrography dataset" (<https://www.bco-dmo.org/dataset/716685>) for these related data.

## Data Processing Description

Note that all raw data are contained in the NODC R2R repository for cruise KM1128. This deposition includes only the processed data.

Data were processed using SeaBird Data Processing software, version 7.21f.

The processing routine for the first sensor package (file: km1128\_001\_bin.cnv) utilized the following processing parameters:

```
# datcnv_skipover = 0
# datcnv_ox_hysteresis_correction = yes
# datcnv_ox_tau_correction = yes
# filter_low_pass_tc_A = 0.150
# filter_low_pass_tc_B = 2.000
# filter_low_pass_A_vars = prDM upoly0 upoly1 xmiss
# filter_low_pass_B_vars =
# alignctd_adv = sbeox0Mm/Kg 2.000

# loopedit_minVelocity = 0.250
# loopedit_surfaceSoak: minDepth = 2.0, maxDepth = 20, useDeckPress = 0
# loopedit_excl_bad_scans = yes
# wildedit_pass1_nstd = 2.0
# wildedit_pass2_nstd = 20.0
# wildedit_pass2_mindelta = 0.000e+000
# wildedit_npoint = 100
# wildedit_vars = prDM depSM t090C c0mS/cm sbeox0Mm/Kg upoly0 upoly1 t190C c1mS/cm xmiss
# wildedit_excl_bad_scans = yes
```

The processing routine for the second sensor package (all other files) utilized the following processing parameters:

```
# datcnv_skipover = 0
# datcnv_ox_hysteresis_correction = yes
# datcnv_ox_tau_correction = yes
# filter_low_pass_tc_A = 0.150
# filter_low_pass_tc_B = 2.000
# filter_low_pass_A_vars = prDM fISP
# filter_low_pass_B_vars =
# alignctd_adv = sbeox0Mm/Kg 2.000

# loopedit_minVelocity = 0.250
# loopedit_surfaceSoak: minDepth = 2.0, maxDepth = 20, useDeckPress = 0
# loopedit_excl_bad_scans = yes
# wildedit_pass1_nstd = 2.0
# wildedit_pass2_nstd = 20.0
# wildedit_pass2_mindelta = 0.000e+000
# wildedit_npoint = 100
# wildedit_vars = prDM depSM t090C sbeox0Mm/Kg fISP c0mS/cm
# wildedit_excl_bad_scans = yes
# binavg_bintype = meters
# binavg_binsize = 1
# binavg_excl_bad_scans = yes
```

```
# binavg_skipover = 0
# binavg_surface_bin = no, min = 0.000, max = 0.000, value = 0.000
```

### Problem Report:

The entire rosette, including the CTD sensor package, came free from the hydrowire at Station 2 and was never recovered. A reconstituted, but limited, sensor package was assembled by Station 5. Details given above refer either to the 'first package' (Station 1) or 'second package' (Stations 5-12). Gaps in the dataset were filled using CTD data from the sensor package on the trace metal clean rosette (TMR), deposited as a separate dataset in BCO-DMO.

No ship's CTD data were taken at Station 11.

Surface (0-10 m) oxygen data are suspect.

### BCO-DMO Processing:

- modified parameter names to conform with BCO-DMO naming conventions (removed spaces, replaced "/" with underscores);
- replaced blanks (missing data) with "nd";
- converted longitude values from positive to negative to indicate West.

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## Data Files

File
<b>CTD.csv</b> (Comma Separated Values (.csv), 1.63 MB) MD5:9f456c55921aaa04e99c0f7b6cf2dc11 Primary data file for dataset ID 716469

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## Related Publications

Santoro, A. E., Saito, M. A., Goepfert, T. J., Lamborg, C. H., Dupont, C. L., & DiTullio, G. R. (2017). Thaumarchaeal ecotype distributions across the equatorial Pacific Ocean and their potential roles in nitrification and sinking flux attenuation. *Limnology and Oceanography*, 62(5), 1984–2003. doi:[10.1002/lno.10547](https://doi.org/10.1002/lno.10547)  
*Results*

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## Parameters

Parameter	Description	Units
cruise	Cruise identifier	unitless
Station	Station identifier	unitless
Lat	Station latitude in decimal degrees (North = positive)	decimal degrees
Long	Station longitude in decimal degrees (East = positive)	decimal degrees
cast	Cast number	unitless
prDM	Pressure, Digiquartz	decibars (db)
depSM	Sample depth	meters (m)
t090C	Temperature (ITS-90)	degrees Celsius ( C)
fISP	Chlorophyll fluorescence, Seapoint	unitless
C0mS_cm	Conductivity	milliSiemens per centimeter (mS/cm)
sbeox0mM_kg	Oxygen, SBE 43	micromoles per kilogram (umol/Kg)
upoly0	Upoly 0, Wetlabs ECOFLNTU (Chlorophyll fluorescence)	unitless
t190C	Temperature 2 (secondary) (ITS-90)	degrees Celsius ( C)
c1mS_cm	Conductivity 2 (secondary)	milliSiemens per centimeter (mS/cm)
xmiss	Beam Transmission, Chelsea/Seatech (percent, %)	unitless (percent)
sal00	Salinity, Practical	practical salinity units (PSU)
density00	Density	kilograms per cubic meter (Kg/m <sup>3</sup> )
sigma_theta	Sigma-theta density	kilograms per cubic meter (Kg/m <sup>3</sup> )
flag	Flag	unitless

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## Instruments

<b>Dataset-specific Instrument Name</b>	Sea-Bird SBE911+
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus
<b>Generic Instrument Description</b>	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics

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## Deployments

KM1128

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/59053">https://www.bco-dmo.org/deployment/59053</a>
<b>Platform</b>	R/V Kilo Moana
<b>Start Date</b>	2011-10-01
<b>End Date</b>	2011-10-25
<b>Description</b>	This is a MetZyme project cruise. The original cruise data are available from the NSF R2R data catalog.

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## Project Information

### Connecting Trace Elements and Metalloenzymes Across Marine Biogeochemical Gradients (GPc03) (MetZyme)

**Coverage:** Tropical North Pacific along 150 degrees West from 18 degrees North to the equator

MetZyme project researchers will determine the role of enzymatic activity in the cycling of trace metals. Specifically the research will address the following questions: (1) degradation of sinking particulate organic material in the Tropical North Pacific can be influenced by the ability of microbes to synthesize zinc proteases, which in turn is controlled by the abundance or availability of zinc, and (2) methylation of mercury is controlled, in part, by the activity of cobalt-containing enzymes, and therefore the supply of labile cobalt to the corrinoid-containing enzymes or co-factors responsible for methylation. To attain their goal, they will collect dissolved and particulate samples for trace metals and metalloenzymes from three stations along a biogeochemical gradient in the Tropical North Pacific (along 150 degrees West from 18 degrees North to the equator). Sinking particles from metal clean sediment traps will also be obtained. The samples will also be used to carry out shipboard incubation experiments using amendments of metals, metal-chelators, B12, and proteases to examine the sensitivity and metal limitation of heterotrophic, enzymatic degradation of organic matter within the oceanic "Twilight Zone" (100-500 m). This study will result in a novel metaproteomic/metalloenzyme datasets that should provide insights into the biogeochemical cycling of metals, as well as co-limitation of primary productivity and controls on the export of carbon from the photic zone. In addition to the final data being contributed to BCO-DMO, an online metaproteomic data server will be created so the community has access to the raw data files generated by this research.

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## Program Information

### U.S. GEOTRACES (U.S. GEOTRACES)

**Website:** <http://www.geotraces.org/>

**Coverage:** Global

**GEOTRACES** is a [SCOR](#) sponsored program; and funding for program infrastructure development is provided by the [U.S. National Science Foundation](#).

GEOTRACES gained momentum following a special symposium, S02: Biogeochemical cycling of trace elements and isotopes in the ocean and applications to constrain contemporary marine processes (GEOSECS II), at a 2003 Goldschmidt meeting convened in Japan. The GEOSECS II acronym referred to the Geochemical Ocean Section Studies To determine full water column distributions of selected trace elements and isotopes, including their concentration, chemical speciation, and physical form, along a sufficient number of sections in each

ocean basin to establish the principal relationships between these distributions and with more traditional hydrographic parameters;

- \* To evaluate the sources, sinks, and internal cycling of these species and thereby characterize more completely the physical, chemical and biological processes regulating their distributions, and the sensitivity of these processes to global change; and

- \* To understand the processes that control the concentrations of geochemical species used for proxies of the past environment, both in the water column and in the substrates that reflect the water column.

GEOTRACES will be global in scope, consisting of ocean sections complemented by regional process studies. Sections and process studies will combine fieldwork, laboratory experiments and modelling. Beyond realizing the scientific objectives identified above, a natural outcome of this work will be to build a community of marine scientists who understand the processes regulating trace element cycles sufficiently well to exploit this knowledge reliably in future interdisciplinary studies.

Expand "Projects" below for information about and data resulting from individual US GEOTRACES research projects.

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1031271</a>

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