

TITLE: CTD casts, BEST Summer Cruise 2008, USCGC Healy (HLY0803)

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SAME AS ABOVE and

Data/documentation/metadata: Peggy Sullivan peggy.sullivan@noaa.gov

Data Files: Dave Kachel dave.kachel@noaa.gov

FUNDING SOURCE AND GRANT NUMBER:

National Science Foundation through BEST (Bering Sea Ecosystem Study)

Award Number 0732640

DATA SET OVERVIEW:

-Introduction or abstract

This CTD data set, consisting of 210 casts, was collected during a multi-disciplinary Bering Sea ice cruise on the USCGC Healy (HI0803, July 3- 31, 2008). The cruise was funded by NSF for the BEST (Bering Sea Ecosystem Study) program, and supported by numerous agencies and institutions. CTD operations on this cruise were managed by personnel from NOAA/PMEL in the EcoFOCI program, with technical expertise from SCRIPPS, and deployment assistance from Healy personnel. Water samples from casts were collected by various parties relative to their research needs. Profile data from CTD instruments were processed at NOAA/PMEL/EcoFOCI using standard techniques. Data from bottle samples include phosphate, silicate, nitrate, nitrite, ammonium, and chlorophyll. Data files are an array on a 1-meter grid and combine both averaged CTD profile data, and bottle samples where depths with no data are listed “-1E+10” in text data files, and as 1.0e-35 in NetCDF files. CTD data contact people: Phyllis Stabeno, Peggy Sullivan. Nutrient and bottle data contact: Calvin Mordy.

-Time period covered by the data: July 3- 31, 2008

-Physical location of the measurement or platform (latitude/longitude/elevation)

210 CTD casts deployed within latitude 54.30N to 62.22N and longitude 163.13W to 179.39W

-Any World Wide Web address references (i.e. additional documentation such as Project WWW site)

Cruise Site: <http://www.ecofoci.noaa.gov/cruiseWeb/ice08/>
BEST/BSIERP Site: [http://bsierp.nprb.org/BEST Data Management:](http://bsierp.nprb.org/BEST>Data%20Management%3A%20http://bsierp.nprb.org/data_mgt/)
http://bsierp.nprb.org/data_mgt/
NSF Award: <http://www.checkout.org.cn/awardsearch/showAward.do?AwardNumber=0732640>

INSTRUMENT DESCRIPTION:

-Brief text describing the instrument with references

SeaBird SBE-911plus CTD unit with dual temperature and conductivity sensors, and added instruments as listed (www.seabird.com/products/profilers.htm):

Conductivity S/N 2568

Conductivity S/N 2561

Temperature S/N 2855

Temperature S/N 2796

Pressure S/N CTD-639 sensor-83012

PAR /Irradiance, Biospherical/Licor S/N QSP2300-70115

SPAR/Surface Irradiance S/N QSR2200-20270

Transmissometer, Chelsea/Seatech/Wetlab CStar S/N CST-390DR

Fluorometer, Chelsea Aqua 3 S/N 088234

Oxygen sensor, SBE-43 S/N 458

-Figures (or links), if applicable

Web reference to instrument:

http://www.seabird.com/products/spec_sheets/911data.htm

Figure showing CTD transect map: [hly0803_PMEL_CTDmap.gif](#)

-Table of specifications (i.e. accuracy, precision, frequency, etc.)

Page 10 of Seabird instrument reference (above)

DATA COLLECTION and PROCESSING:

-Description of data collection

Data were collected via CTD platform operated by Scripps Institution of Oceanography technicians. At each CTD location, the CTD rosette was lowered to 10 meters to equilibrate, brought to surface, then lowered to within 5m of the bottom, at ~30m/minute down to 150 m (on average) and ~50m/minute below that. Water bottles were fired at desired depths on the upcast. Once on board, numerous water samples were taken from Niskin bottles by members of the interdisciplinary science team.

-Description of derived parameters and processing techniques used

All data are either instrument variables, calculated variables, or measured from bottle samples. Instrument variables: pressure, temperature (primary, secondary), oxygen, transmissivity, attenuation, PAR, fluorometer.

Calculated values: salinity (primary and secondary, derived from conductivity and temperature, corrected by calibration with salt samples), chlorophyll-a (factory calibration), sigma-t, and dynamic height.

Bottle samples: nutrients (phosphate, silicate, nitrate, nitrite, ammonium), chlorophyll-a (total and size fractionated using two methods; acidification and Welschmeyer). Phaeopigments (total and size fractionated) were obtained from Chlorophyll-a samples.

Not all variables were sampled from all bottles or on all casts. Selected variables have dual-unit listings. Two chlorophyll methods were used: the acidification technique (Holm-Hansen, O., et al, 1965), and the Welschmeyer method (Welschmeyer, 1985). Calibration coefficients for instruments are available in the attached file hly0803_CTDCalFile.txt

-Description of quality control procedures and Processing

Data are processed using Seabird CTD software and calibration file. Post-processing at the Pacific Marine Environmental Laboratory includes filtering extreme outliers, extrapolation of values from the top value collected at 3-5m to the surface. Each cast is visually reviewed for reasonableness and density inversions (greater than 0.02 sigma-t) caused by spurious measurements. This process is facilitated by comparison of the outputs of the 2 temperature and conductivity sensors. Profile data are bin-averaged to 1 meter. Nutrient samples were analyzed according to the methods of Gordon, et al (see reference below). Samples were collected in 50 ml high-density polyethylene bottles that were rinsed first with 10% HCl prior to each station, and rinsed at least three times with sample before filling. Some samples were refrigerated for 3-12 hours prior to analysis.

DATA FORMAT:

-Data file structure, format and file naming conventions (e.g. column delimited ASCII, NetCDF, GIF, JPEG, etc.)

Data sets include continuous profile data and bottle samples from discrete depths. Data files are provided in two formats: NetCDF, and tab-delimited ASCII text.

NetCDF (EPIC standard) format includes meteorological and other metadata. "Code" is an EPIC-NetCDF-specific key code defining variables and units (see list below). Missing data are denoted by 1.0e-35. The format is defined at Unidata and PMEL-EPIC Web

Sites: <http://www.epic.noaa.gov/epic/software/>

<http://www.unidata.ucar.edu/software/netcdf/>

-Data format and layout (i.e. description of header/data records, sample records)

List of Variables with Short Name and Units (included in header) and grid definition

Axes:

code	name	type	lower corner	upper corner	units
501	x lon	EVEN	165.3537 W		degree_west
500	y lat	EVEN	54.3000 N		degree_north
1	z dep	EVEN	0.00	83.00	dbar
624	t time	EVEN	04-Jul-2008 02:08		True Julian Day

Variable(s):

code	name	units	type	
28	T	TEMPERATURE (C)	C	4
35	T2	Secondary Temperature	C	4
971	rFv	raw fluorometer Volts(CTD)	Volts	4
906	Fch	Chlorophyll A	ugrams/l	4
916	PAR	Photosynthetically Active Radi	V	4
905	PAR	Photosynthetic Active Radiatio	uEin m-2 s-1	4
918	SPAR	Surface Photosynthetically Act	uEin m-2 s-1	4

65	O	OXYGEN (UMOL/KG)	umol/kg	4
62	OST	OXYGEN, %SAT	%	4
904	Tr	Transmissometry (CTD)	%	4
55	ATTN	ATTENUATION	m-1	4
41	S	SALINITY (PSU)	PSU	4
42	S	SALINITY (PSU)	PSU	4
70	ST	SIGMA-T (KG/M**3)	kg m-3	4
10	DYN	DYNAMIC METERS	dyn-m	4
103	BTL	NISKIN BOTTLE NUMBER		4
286	PO4	PHOSPHATE (micromoles/kg)	uM/kg	4
288	SI	SILICATE (micromoles/kg)	uM/kg	4
282	NO3	NITRATE (micromoles/kg)	uM/kg	4
284	NO2	NITRITE (micromoles/kg)	uM/kg	4

Number of columns of data: 18 Number of rows of data: 84 Number of lines per row: 3

Sample Metadata (in addition to variables above) that includes items generated both by SeaBird processing routines, and items added by in-house data processing software for EPIC NetCDF formatted output.

CREATION_DATE = 14:27 2-DEC-08
 CRUISE = H10803
 CAST = 001
 INST_TYPE = Sea-Bird CTD SBE 9
 DATA_TYPE = CTD
 DATA_CMNT = Data from Seasoft File 001.cnv:using temp28,sal41:using temp28,sal41
 COORD_SYSTEM = GEOGRAPHICAL
 WATER_MASS = B
 SEA_STATE = 1
 BAROMETER = 998
 WIND_DIR = 165
 WIND_SPEED = 4
 VISIBILITY = 8
 CLOUD_AMOUNT = 8
 AIR_TEMP = 7.19999981
 WET_BULB = 6.5
 WATER_DEPTH = 79
 PROG_CMNT1 = cat_ctd v1.35 02Dec2008
 STATION_NAME = up1
 EPIC_FILE_GENERATOR = SEASOFT2EPIC_CTD (Version 1.35, 01-May-2003)
 PROG_CMNT2 = cat_ctd v1.20 03Jun2004
 PROG_CMNT3 = CTDVAR added 2 vars:using temp28,sal41
 EDIT_COMMENT_01 = eps65: depth(0:10000) mod_coefs(a,b)= 1.089600 -1.510300
 EDIT_COMMENT_02 = eps41: depth(0:10000) mod_coefs(a,b)= 1.000000 -0.000200
 EDIT_COMMENT_03 = eps42: depth(0:10000) mod_coefs(a,b)= 1.000000 0.000900
 PROG_CMNT4 = EDIT_CTD (v1.03, rev 01Aug07)

-Description of flags, codes used in the data, and definitions (i.e. good, questionable, missing, estimated, etc.) Missing data are denoted by -1.0e+10. All data points are either accepted (retained) or rejected (deleted) during processing, so data are all defined as good. Surface values above 5-10 meters can be extrapolated to surface.

DATA REMARKS:

-Software compatibility (i.e. list of existing software to view/manipulate the data)

Software for viewing and manipulating NetCDF data are listed at the Unidata/UCAR site <http://www.unidata.ucar.edu/software/netcdf/software.html> . “ncdump” tool is suggested as a start. Ferret software (NOAA/PMEL) and Matlab can read and manipulate NetCDF files and grids.

REFERENCES:

-List of documents cited in this data set description

- Seabird SBE 911plus CTD manual
http://www.seabird.com/products/spec_sheets/911data.htm
- CTD map: hly0803_PMEL_CTDmap.gif
- CTD Calibration file: hly0303_CTDCalFile.txt
- Gordon, L.I., Jennings, J.C., Jr., Ros, A.A. and Krest, J.M., 1993. A suggested protocol for continuous flow automated analysis of seawater nutrients (Phosphate, nitrate, nitrite and silicic acid) in the WOCE Hydrographic Program and the Joint Global Ocean fluxes Study. WOCE Operations Manual, Part 3.1.3 "WHP Operations and Methods" (WOCE Hydrographic Program Office, Methods Manual 91-1) Bundesamt für Seeschifffahrt und Hydrographie, Postfach 30 12 20, 2000 Hamburg 36 Germany.
<http://chemoc.coas.oregonstate.edu:16080/~lgordon/cfamanual/whpmanual.pdf>--N.A.
- Welschmeyer. 1985(1994). Fluorometric analysis of chlorophyll- a in the presence of chlorophyll b and pheopigments, *Limnol.Oceanogr.* 39(8), 1994, 1985-1992.
- HOLM-HANSEN, O., C. J. LORENZEN, R. W. HOLMES, AND J. D. STRICKLAND. 1965. Fluorometric determination of chlorophyll. *J. Cons. Int. Explor. Mer* 30: 3-15.
- NSF Award: <http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0732640>