

GRIIDC CTD Data Submission Guide

Why is GRIIDC providing guidance on CTD Data Submission?

- The GoMRI Research Board wants standard oceanographic data to be available for download via the GRIIDC Data Repository and submitted to National Centers for Environmental Information (NCEI). CTD data submissions that follow standard formatting and organizational guidelines will pass through the Data Package Review process faster and become available sooner.

What is CTD data?

- CTD instrument packages use electronic sensors to measure temperature, conductivity, pressure and other parameters such as fluorescence, water clarity and dissolved oxygen. CTD data is usually available for post-processing and submission within a reasonably short period of time after collection.
- Associated water samples may be collected during the CTD cast for analyses of nutrients, pigments, suspended material, and other water quality parameters. These samples are typically sent to shore-based laboratories and can take weeks to months for analyses to be completed, and should be submitted to GRIIDC as separate datasets from the CTD data

When should CTD data be submitted?

- CTD data should be submitted to GRIIDC as soon as practical after reasonable quality assurance processing steps have been completed. A visual inspection of plots made from the final datasets and a review of the supplementary information prior to submission is recommended as a final quality check. This quality check should be performed by the data manager.

How should CTD data be submitted?

- Data should be submitted in ASCII or NetCDF format. ASCII files written in space, comma, or tab delimited variables are easily read by both humans and computers. Common file extensions include *.txt and *.cnv. Spreadsheet data (e.g. Excel) should be saved as comma separated variables (*.csv) or other text formats for submittal rather than Excel workbooks (*.xls,*.xlsx). NetCDF is a widely-used self-describing scientific data format that is compatible with a large number of common software analysis packages such as Matlab and is accepted by NCEI.
- There should be sufficient information submitted with the data (preferably inside the individual files themselves) such that the CTD data are completely understandable. This information includes variable and parameter names (e.g., t is temperature), the units of measure (e.g., degrees Celsius), the latitude and longitude coordinates and depth where collected, and date and time when collected. Date-time should include time zone or be expressed in Greenwich Mean Time (GMT) whenever possible and ideally written in ISO 8601 format (e.g., 2015-10-25T22:34:51Z).

Optional Steps to make data even more usable

- In addition to ASCII or NetCDF files, providers can submit raw files (*.hex or *.bin) together with configuration files (*.con or *.xmlcon) so that subsequent users may elect to process data differently — different filtering or binning.
- Submit CTD in NetCDF formats so that it can be distributed by web-based data servers such as THREDDS. See the GRIIDC NetCDF guide for more details.

Following are two examples of ASCII CTD data files. The first was entirely constructed by the data provider. It includes programmatic information in addition to parameter names, units, date, time, and auxiliary information such as bottom depth. The second example is output from the SeaBird (a widely purchased brand of CTD) processing software. The file contains sufficient information to completely understand and use the data. Programmatic data will be found in the metadata file produced by GRIIDC after the data has been submitted.

Example 1. Sample ASCII CTD file showing metadata header and data.

```

$ LATEX Version: Last Modified 04-Sep-98
*****
**          Texas-Louisiana Shelf          **
** Circulation and Transport Processes Study (LATEX-A). **
**          **                             **
** Data produced by;                       **
**          **                             **
**          The LATEX-A PROGRAM OFFICE     **
**          Department of Oceanography     **
**          Texas A&M University           **
**          College Station, TX 77843-3146 **
**          **                             **
** Sponsored by;                           **
**          **                             **
**          The U.S. Minerals Management Service (MMS) **
**          MMS Project: OCS No.14-35-0001-30509 **
**          **                             **
**          (409) 862-4169                 **
** Archived by;                             **
**          **                             **
**          The National Oceanographic Data Center (NODC) **
**          NODC Project Code 0212        **
**          **                             **
** Please direct any questions about these data to **
** Dr. Matthew Howard or Dr. Ann Jochens at Texas A&M. **
*****
*
* Oxygen sensor data are provided as probe current in **
* column 8, oxygen probe temperature in column 9, and **
* descent rate in column 10 (to compute dOc/dt). The **
* user may wish to convert the oxygen data to oxygen **
* concentrations using the method of Millard (1993, **
* CTD oxygen calibration procedure, WOCE Operations **
* Manual, 3.1.3. WHP Operations and Method, WOCE Report **
* No. 68/9, Section 4). Bottle oxygen data for use in **
* calibrations are in the bottle data files submitted **
* to NODC along with these data. For more information **
* on these data see Jochens, A. E., D. A. Wiesenburg, **
* L. E. Sahl, C. N. Lyons, and D. A. DeFreitas, 1998, **
* "LATEX Shelf Data Report: Hydrography, April 1992 **
* through November 1994", TAMU Oceanography Technical **
* Report 96-6-T.                             **
*****
*****
* Instrument Type: Sea-Bird SBE 9
* SB Software Ver: 4.026
* Vessel      : J.W. Powell
* Cruise      : H06 aka 93F
* Station     : 066
* Cast Date-Time : 1993-06-30T00:32:00Z

```

* Latitude : 29.0808 N
 * Longitude : 92.0027 W
 * Water Depth (m): 12.9
 * \$LATEX VERSION 05/29/1996 14:58- added lat/lon, times and depths to headers

* Column 1: Pressure (decibars)
 * Column 2: Depth (salt water) (meters)
 * Column 3: Temperature (deg C)
 * Column 4: Potential temperature (deg C)
 * Column 5: Conductivity (S/m)
 * Column 6: Salinity (PSS-78 psu)
 * Column 7: Sigma-theta (kg/m^3)
 * Column 8: Oxygen current (microamps)
 * Column 9: Oxyyen temperature (deg C)
 * Column 10: Instrument package descent rate dz/dt (m/s)
 * Column 11: Transmission (percent)
 * Column 12: Transmission (volts)
 * Column 13: Irradiance (PAR) (microEinsteins/m^2/sec)
 * Column 14: Irradiance (PAR) (volts)
 * Column 15: Relative fluoresence (volts)
 * Column 16: Relative Backscatterance (volts)

* Press	Depth	Temp	PoTemp	Cond	Sal	Sig-Th	O2-Cur	O2Temp	dz/dt	%Tran	Tran-V	PAR	PAR-V	FL-V	OBS-V
END															
1.510	1.5	31.9436	31.9432	4.538019	25.3898	13.8863	0.67400	29.728	0.230	74.10	3.706	0.653E+02	2.103	1.960	-9.000
2.013	2.0	31.7050	31.7045	4.559254	25.6442	14.1577	0.69300	29.747	0.391	74.47	3.725	0.532E+02	2.014	1.977	-9.000
2.517	2.5	31.4458	31.4451	4.539849	25.6556	14.2551	0.72300	29.765	0.409	74.71	3.737	0.421E+02	1.912	1.950	-9.000
3.020	3.0	31.4269	31.4261	4.535501	25.6379	14.2484	0.74200	29.774	0.481	74.83	3.743	0.346E+02	1.827	1.916	-9.000
3.524	3.5	31.2298	31.2289	4.548492	25.8220	14.4526	0.94700	29.785	0.451	75.30	3.766	0.280E+02	1.736	1.873	-9.000
4.027	4.0	31.1081	31.1071	4.572930	26.0402	14.6565	1.01600	29.799	0.381	76.10	3.807	0.226E+02	1.643	1.843	-9.000
4.530	4.5	31.0523	31.0512	4.617626	26.3537	14.9092	0.98000	29.816	0.211	78.60	3.932	0.184E+02	1.553	1.749	-9.000
5.034	5.0	30.8866	30.8854	4.660203	26.7139	15.2337	0.88000	29.854	0.127	81.53	4.078	0.156E+02	1.481	1.687	-9.000
5.537	5.5	30.7995	30.7981	4.671602	26.8340	15.3529	0.88300	29.891	0.137	80.24	4.014	0.138E+02	1.428	1.795	-9.000
6.041	6.0	30.6972	30.6958	4.677743	26.9291	15.4583	0.87400	29.928	0.133	80.96	4.050	0.124E+02	1.383	1.802	-9.000

Example 2. Sample ASCII CTD File – Sea-Bird CNV file

```
* Sea-Bird SBE 19plus V2 Data File:
* FileName = C:\Documents and Settings\TAMU\Desktop\TAMU_MS07\MS07_L01.hex
* Software Version Seasave V 7.22.3
* Temperature SN = 6073
* Conductivity SN = 6073
* System Upload Time = Jun 25 2013 07:37:50
* NMEA Latitude = 28 26.3633 N
* NMEA Longitude = 095 43.6194 W
* NMEA UTC (Time) = Jun 25 2013 07:37:18
* Store Lat/Lon Data = Append to Every Scan
** Ship: R/V Manta
** Station: L01
** Operator: H, Zimmerle, E. Webb
** started at L012
* Real-Time Sample Interval = 0.2500 seconds
* System UTC = Jun 25 2013 07:37:50
# nquan = 19
# nvalues = 360
# units = specified
# name 0 = latitude: Latitude [deg]
# name 1 = longitude: Longitude [deg]
# name 2 = prdM: Pressure, Strain Gauge [db]
# name 3 = depSM: Depth [salt water, m]
# name 4 = tv290C: Temperature [ITS-90, deg C]
# name 5 = potemp090C: Potential Temperature [ITS-90, deg C]
# name 6 = sal00: Salinity, Practical [PSU]
# name 7 = density00: Density [density, Kg/m^3]
# name 8 = sigma-t00: Density [sigma-t, Kg/m^3 ]
# name 9 = sbeox0ML/L: Oxygen, SBE 43 [ml/l]
# name 10 = wetCDOM: Fluorescence, WET Labs CDOM [mg/m^3]
# name 11 = fleCO-AFL: Fluorescence, WET Labs ECO-AFL/FL [mg/m^3]
# name 12 = v0: Voltage 0
# name 13 = v1: Voltage 1
# name 14 = v2: Voltage 2
# name 15 = v3: Voltage 3
# name 16 = v4: Voltage 4
# name 17 = v5: Voltage 5
# file_type = ascii
*END*
28.43938 -95.72700 -0.102 -0.102 27.4746 27.4782 0.0000 996.3818 ...
```