

For Using Data

Data Policy	JURCAOS-JAMSTEC
Principal Investigator	Data Management Office
Use Constraints	See Terms and Conditions about constrain of use.
Data Citation	See Terms and Conditions about data citation.

Quality

DMO-Processed

Instrument

Expendable conductivity temperaturedepth measurements (XCTD)



Overview

Using XCTD (eXpendable Conductivity Temperature Depth profiler) system, the vertical distribution of water temperature and salinity are observed during free fall of its probe part in the seawater. Observed temperature and conductivity are transmitted to the data processor on board by the digital signal. The digital signal is converted to the temperature, conductivity and depth by data processor as binary data. Binary data is transmitted from data processor to PC. The PC calculates salinity from temperature, conductivity and depth, and those properties are recorded in PC as the ASCII files.

Measurement System

1) Launcher

Hand launcher

Manufacturer : Sippican, Inc.
 Operation area : Rear upper deck

Automatic launcher

Manufacturer : Tsurumi Seiki Co., LTD.
 Location : Rear upper deck. The control panel is installed in the observatory.

2) Converter

Manufacturer : Tsurumi Seiki Co., LTD.
 Type : See 'Use probes'
 Sampling rate : 40 msec
 Location : Observatory

3) XCTD probe specifications

Probe Type	TSK XCTD-1, TSK XCTD-1N	TSK XCTD-2, TSK XCTD-2N	TSK XCTD-3, TSK XCTD-3N	TSK XCTD-4, TSK XCTD-4N
Temperature range	-2 to 35 [deg-C]			
Temperature accuracy	+/- 0.02 [deg-C]			
Temperature resolution	0.01 [deg-C]			
Conductivity range	0 to 60 [mS/cm]			
Conductivity accuracy	+/- 0.03 [mS/cm]			
Conductivity resolution	0.015 [mS/cm]			
Measurement depth	1000 [m]	1850 [m]	1000 [m]	1850 [m]
Depth accuracy	5 or +/- 2% of depth [m]; whichever is larger			
Maximum elapsed time	300 [sec]	600 [sec]	200 [sec]	502 [sec]
Rated ship speed	12 [knot]	3.5 [knot]	20 [knot]	6 [knot]

Since XCTD carries no pressure sensor, we need to estimate depth from the elapsed time. The fall-rate equation is as follows.

$$Z = at + 10E^{-3} * bt^2$$

Where Z(m) is the depth and t(sec) is the elapsed time.

In addition, coefficients of the fall-rate equation are different by probe types.

Probe Type	TSK XCTD-1, TSK XCTD-1N	TSK XCTD-2, TSK XCTD-2N	TSK XCTD-3, TSK XCTD-3N	TSK XCTD-4, TSK XCTD-4N
Coefficient-a	3.42543	3.43898	5.07598	3.68081
Coefficient-b	-0.47	-0.31	-0.72	-0.47

Use probes

The list of a XCTD type used in each cast is as follows.

Cast name	Probe Serial No.	Probe Type	Launcher	Converter
XCTD-000120191029	17100202	XCTD-1	Auto	MK-150N
XCTD-000220191029	17100205	XCTD-1	Auto	MK-150N
XCTD-000320191029	17046401	XCTD-1	Auto	MK-150N
XCTD-000420191029	17100203	XCTD-1	Auto	MK-150N
XCTD-000520191029	17100223	XCTD-1	Auto	MK-150N
XCTD-000620191030	17100208	XCTD-1	Auto	MK-150N
XCTD-000720191030	17100204	XCTD-1	Auto	MK-150N
XCTD-000820191030	17100207	XCTD-1	Auto	MK-150N
XCTD-000920191030	17100206	XCTD-1	Auto	MK-150N
XCTD-001020191030	17100209	XCTD-1	Auto	MK-150N
XCTD-001120191030	17100210	XCTD-1	Auto	MK-150N
XCTD-001220191030	18107320	XCTD-1	Auto	MK-150N
XCTD-001320191030	17100211	XCTD-1	Auto	MK-150N
XCTD-001420191030	18107317	XCTD-1	Auto	MK-150N
XCTD-001520191030	18107319	XCTD-1	Auto	MK-150N

Data processing

1) For sensor's stability, values of less than 1 m for temperature are replaced by missing values, respectively, based on manufacturer's recommendation.

2) Quality control

QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure.

- The gradient check of adjacent depth data
- The density inversion check
- The broad range check set up at given ocean space and depth

Please see the paper for quality control procedure in detail.

Quality control and processing of historical oceanographic temperature, salinity, and oxygen data.

P. Boyer and Levitus, 1994. NOAA technical report NESDIS ; 81

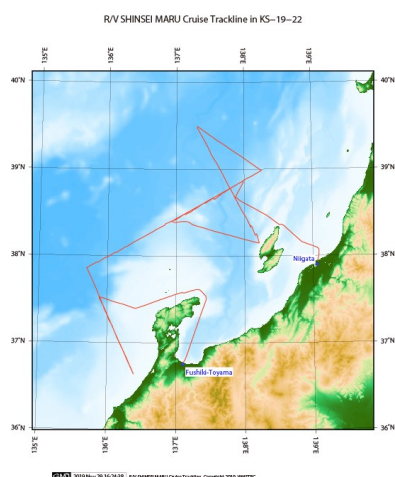
* <https://repository.library.noaa.gov/view/noaa/13443>

In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.

Note

If you would like the raw data set, please contact DMO at "dmo@jamstec.go.jp".

Related Information



KS-19-22

Ship Name:	SHINSEI MARU
Period:	2019/10/25 - 2019/10/31
Chief Scientist:	Yusuke Kawaguchi (AORI, The University of Tokyo)
Proposal:	Interaction between TWC front and internal gravity waves in the central Japan Sea: Observations of turbulent mixing and primary production

Format Description for XCTD DMO

Format Description for the DMO-Processed Data

Each data file contains one line header (meta data) followed by data lines for each cast.

The number of data lines are recorded in the header.

Header part

No.	Column	Content	Format	Remarks
1	1	Header ID	a1	fixed as '#'
2	3 - 6	Data ID	a4	XCTD
3	8 - 22	Cruise ID	a15	
4	33 - 40	Date	i8	YYYYMMDD (UTC)
5	42 - 45	Time	i4	hhmm (UTC)
6	47 - 55	Latitude	i2,a1,f5.2,a1	dd-mm.mmN(S)
7	57 - 66	Longitude	i3,a1,f5.2,a1	ddd-mm.mmE(W)
8	68 - 71	Number of data lines	i4	
9	72 - 73	Terminator	a2	[CR][LF]

Data part

No.	Column	Content	Format	Unit	Remarks
1	1 - 11	Depth	f11.1	m	
2	12 - 22	Temperature	f11.2	deg-C	ITS-90
3	23 - 33	Salinity	f11.3	PSU	PSS-78
4	45 - 55	Quality control flag	i11		45 - 51 : space 52 : flag of depth 53 : flag of temperature 54: flag of salinity 55 : space
5	56 - 57	Terminator	a2		[CR][LF]

Each contents of the data part is stored in 11 bytes.

Missing value is presented by '-5', and error value is presented by '-9'.

Definition of Quality Control Flags

1) Depth Flags

- 0 - accepted value
- 1 - error in recorded depth (same or less than previous depth)
- 2 - density inversion

2) Observed Level Flags

- N - missing value
- 0 - accepted value
- 1 - range outlier (outside of broad range check)
- 2 - failed inversion check
- 3 - failed gradient check
- 4 - zero anomaly
- 5 - failed combined gradient and inversion checks
- 6 - failed range and inversion checks
- 7 - failed range and gradient checks
- 8 - failed range and zero anomaly checks
- 9 - failed range and combined gradient and inversion checks
- A - failed visual check