

For Using Data

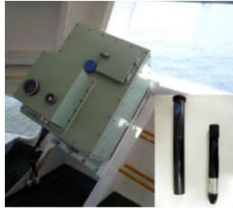
Data Policy	JAMSTEC
Principal Investigator	Data Management Office
Use Constraints	See Terms and Conditions about constrain of use.
Data Citation	See Terms and Conditions about data citation.

Quality

DMO-Processed

Instrument

Expendable conductivity temperaturedepth measurements (XCTD) (since MR11-04)



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 : Port side of rear upper deck (4m from the sea level).
 The control panel is installed in the investigation room.

2) Converter

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

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
202309110013	23066087	XCTD-1N	Auto	MK-150N
202309120733	21107554	XCTD-1N	Auto	MK-150N
202309120752	21107557	XCTD-1N	Auto	MK-150N
202309120809	21107563	XCTD-1N	Auto	MK-150N
202309120827	21107559	XCTD-1N	Auto	MK-150N
202309120841	21107556	XCTD-1N	Auto	MK-150N
202309120902	21107611	XCTD-1N	Auto	MK-150N
202309120920	21107564	XCTD-1N	Auto	MK-150N
202309120936	21107612	XCTD-1N	Auto	MK-150N
202309120953	21107560	XCTD-1N	Auto	MK-150N
202309121849	21107579	XCTD-1N	Auto	MK-150N
202309121915	21107558	XCTD-1N	Auto	MK-150N
202309121947	21107555	XCTD-1N	Auto	MK-150N
202309122016	21107561	XCTD-1N	Auto	MK-150N
202309122201	21107562	XCTD-1N	Auto	MK-150N
202309122226	21107553	XCTD-1N	Auto	MK-150N
202309130336	21107578	XCTD-1N	Auto	MK-150N
202309130442	21107585	XCTD-1N	Auto	MK-150N
202309130533	21107581	XCTD-1N	Auto	MK-150N
202309130627	21107588	XCTD-1N	Auto	MK-150N
202309130723	21107582	XCTD-1N	Auto	MK-150N
202309140545	21107586	XCTD-1N	Auto	MK-150N
202309140644	21107580	XCTD-1N	Auto	MK-150N
202309140733	21107587	XCTD-1N	Auto	MK-150N
202309140915	21107583	XCTD-1N	Auto	MK-150N
202309141006	21107577	XCTD-1N	Auto	MK-150N
202309141948	21107591	XCTD-1N	Auto	MK-150N
202309150117	21107594	XCTD-1N	Auto	MK-150N
202309150703	21107584	XCTD-1N	Auto	MK-150N
202309151951	21107596	XCTD-1N	Auto	MK-150N
202309160125	21107590	XCTD-1N	Auto	MK-150N
202309160816	21107600	XCTD-1N	Auto	MK-150N
202309160851	21107593	XCTD-1N	Auto	MK-150N
202309160930	21107597	XCTD-1N	Auto	MK-150N
202309162149	22072655	XCTD-1N	Auto	MK-150N
202309162345	22072658	XCTD-1N	Auto	MK-150N
202309170942	22072656	XCTD-1N	Auto	MK-150N
202309171232	21107599	XCTD-1N	Auto	MK-150N
202309180447	22072661	XCTD-1N	Auto	MK-150N
202309182003	21107592	XCTD-1N	Auto	MK-150N
202309182123	21107589	XCTD-1N	Auto	MK-150N
202309190949	22072659	XCTD-1N	Auto	MK-150N

202309191215	21107595	XCTD-1N	Auto	MK-150N
202309231440	22072715	XCTD-1N	Auto	MK-150N
202309240338	22072718	XCTD-1N	Auto	MK-150N
202309240539	22072662	XCTD-1N	Auto	MK-150N
202309240735	22072666	XCTD-1N	Auto	MK-150N
202309241859	22072660	XCTD-1N	Auto	MK-150N
202309250845	22072664	XCTD-1N	Auto	MK-150N
202309251118	22072663	XCTD-1N	Auto	MK-150N
202309260816	21107598	XCTD-1N	Auto	MK-150N
202309270904	22072665	XCTD-1N	Auto	MK-150N
202309272107	22072657	XCTD-1N	Auto	MK-150N
202309281032	22072717	XCTD-1N	Auto	MK-150N
202309300319	22072724	XCTD-1N	Auto	MK-150N
202309300408	22072721	XCTD-1N	Auto	MK-150N
202309300457	22072716	XCTD-1N	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.

- i. The gradient check of adjacent depth data
- ii. The density inversion check
- iii. 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>

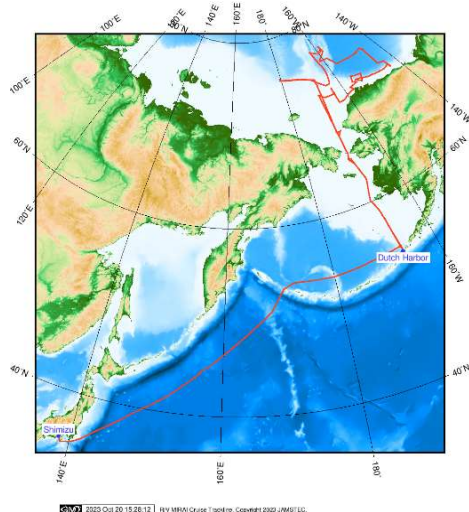
In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.

Note

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

Related Information

R/V MIRAI Cruise Trackline in MR23-06C



MR23-06C

Ship Name:	MIRAI
Period:	2023/08/25 - 2023/10/04
Chief Scientist:	Amane Fujiwara (JAMSTEC)
Proposal:	Arctic Expedition for Environmental Studies Observational study of the Arctic environmental changes: Pacific-Arctic interaction, biogeochemical transport, mixing and marine ecosystem Research and development of under-ice observation technology Quantification of the microplastic inventory in the waters of the western Arctic Ocean and microplastic influx from the Pacific Ocean Changes in clouds and aerosols over the ice-free Arctic Ocean Possibility of the expanding distribution in plankton and fishes associated with sea ice reduction in the Pacific sector of the Arctic Ocean Observation of air-sea-wave-ice interaction over the Pacific Arctic region Investigating the physical and ecophysiological basis of fall phytoplankton blooms in the Chukchi and Beaufort seas Nitrogen Fixation in a Changing Arctic Ocean An Overlooked Source of Nitrogen Exploring microplankton interactions and their functional roles in a changing Arctic Determining the contribution of siphonophores to mesopelagic backscatter in the Arctic Better understanding of climate-driven changes of biogeochemical dynamics in the western Arctic Ocean via R/V Mirai 2023 Cruise A perspective of stable carbon isotope Temporal variations of the carbonate chemical components the Arctic Ocean within summertime Observation of water vapor isotopic ratios Observation of atmospheric greenhouse gases and related species in the North Pacific region

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