MIRAI MR14-02 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

ReadMe   Observation Data   Data Format

Cruise ID: MR14-02
Expendable Conductivity-Temperature-Depth Profiler (XCTD): Processed (DMO)-QCed
Data Policy: JAMSTEC
Observation Items: Depth, Temperature, Salinity
Science Keywords:

> OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE
> OCEANS > SALINITY/DENSITY   > SALINITY

Cruise Report

http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR14-02_all.pdf

ⓘ **For Using Data**

Principal Investigator
> Data Management Office

Use Constraints
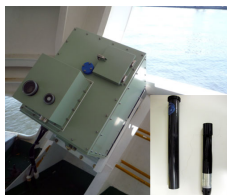> See **Terms and Conditions** about constrain of use.

Data Citation
> See **Terms and Conditions** about data citation.

Instrument

Instrument:

Expendable conductivity temperature depth measurements (XCTD) (MR11-04 -)

Instrument:

Expendable conductivity temperature depth measurements (XCTD) (- MR11-E02)

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.

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.
> Location : Investigation room
> Sampling rate : 40 msec

(3) XCTD probe specifications

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

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-2	TSK XCTD-3	TSK XCTD-4
Coefficient-a	3.42543	3.43898	5.07598	3.68081
Coefficient-b	-0.47	-0.31	-0.72	-0.47

* Coefficients listed above are supplied by Sippican, Inc., in USA.

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

Cast name	Probe Serial No.	Probe Type	Launcher	Converter
201402160420	11011557	XCTD-1	Auto	MK-150N
201402171516	11125648	XCTD-1	Auto	MK-150N
201402210335	13093857	XCTD-1	Auto	MK-150N
201402230335	13093858	XCTD-1	Auto	MK-150N
201402241749	13093861	XCTD-1	Auto	MK-150N
201402241940	13093860	XCTD-1	Auto	MK-150N
201402250706	13093866	XCTD-1	Auto	MK-150N
201402250917	13093863	XCTD-1	Auto	MK-150N
201402251127	13093862	XCTD-1	Auto	MK-150N
201402251320	13093865	XCTD-1	Auto	MK-150N
201402251617	13093864	XCTD-1	Auto	MK-150N
201402252056	13093859	XCTD-1	Auto	MK-150N
201402260006	13093873	XCTD-1	Auto	MK-150N
201402260308	13093871	XCTD-1	Auto	MK-150N
201402260603	13093874	XCTD-1	Auto	MK-150N
201402260853	13093872	XCTD-1	Auto	MK-150N
201402261029	13093870	XCTD-1	Auto	MK-150N
201402261200	13093868	XCTD-1	Auto	MK-150N
201402261335	13093869	XCTD-1	Auto	MK-150N
201402261512	13093867	XCTD-1	Auto	MK-150N
201402270139	13093875	XCTD-1	Auto	MK-150N
201403010043	13093876	XCTD-1	Auto	MK-150N
201403030130	13093877	XCTD-1	Auto	MK-150N
201403050527	13093878	XCTD-1	Auto	MK-150N
201403070255	13093879	XCTD-1	Auto	MK-150N
201403070608	13093880	XCTD-1	Auto	MK-150N
201403080100	13093881	XCTD-1	Auto	MK-150N
201403080253	13093882	XCTD-1	Auto	MK-150N
201403090502	13093883	XCTD-1	Auto	MK-150N
201403100133	13093885	XCTD-1	Auto	MK-150N
201403100539	13093884	XCTD-1	Auto	MK-150N
201403101927	13093886	XCTD-1	Auto	MK-150N
201403110759	13093890	XCTD-1	Auto	MK-150N
201403111000	13093891	XCTD-1	Auto	MK-150N
201403111201	13093892	XCTD-1	Auto	MK-150N
201403111403	13093889	XCTD-1	Auto	MK-150N
201403111608	13093887	XCTD-1	Auto	MK-150N
201403111959	13093895	XCTD-1	Auto	MK-150N
201403112000	13093893	XCTD-1	Hand	MK-130
201403112013	13093900	XCTD-1	Auto	MK-150N
201403112012	13093894	XCTD-1	Hand	MK-130
201403112020	13093888	XCTD-1	Auto	MK-150N
201403112020_Hand	13093896	XCTD-1	Hand	MK-130
201403112028	13093899	XCTD-1	Auto	MK-150N
201403112028_Hand	13093898	XCTD-1	Hand	MK-130

Data processing

(1) For sensor's stablility, values of less than 1 m for temperature and less than 3 m for salinity 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.
    1) The gradient check of adjacent depth data
    2) The density inversion check
    3) The broad range check set up at given ocean space and depth
Please see the site of NODC of the following link for quality control procedure in detail.
    QUALITY CONTROL AND PROCESSING OF HISTORICAL OCEANOGRAPHIC TEMPERATURE, SALINITY, AND OXYGEN DATA
In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.
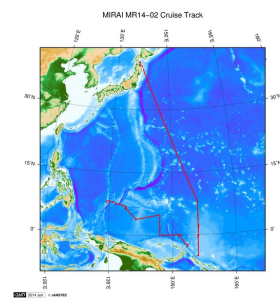
Notice

Since "201403112020", "201403112028" used the hand launcher and the automatic launcher at the same time, they have the same castname. So it added "_Hand" to the castname using the hand launcher.
    Automatic launcher: 201403112020.dat, 201403112028.dat
    Hand launcher : 201403112020_Hand.dat, 201403112028_Hand.dat

Related Information

MR14-02

MIRAI MR14-02 Cruise Track

Ship Name: MIRAI
Period: 2014-02-15 - 2014-03-23
Chief Scientist: Takuya Hasegawa (JAMSTEC)
Project Name: [Tropical Ocean Climate Study (TOCS)]
Proposal ▶ Tropical Ocean Climate Study
Title:

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Update History

2019-08-31	An observation data was registerd.
2019-03-29	An observation data was registerd.
2017-06-14	An observation data was registerd.
2016-03-31	An observation data was registerd.

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Data Tree
Detailed Search

Information of the Ships
NATSUSHIMA
KAIYO
YOKOSUKA
MIRAI
KAIREI
CHIKYU
KAIMEI
SHINSEI MARU
HAKUHO MARU

Information of the Submersibles
KAIKO
SHINKAI 2000
SHINKAI 6500
DEEP TOW
HYPER-DOLPHIN
URASHIMA
YOKOSUKA DEEP TOW
6K Camera DEEP TOW
6K Sonar DEEP TOW
KM-ROV
POWER GRAB SAMPLER (SHELL)
POWER GRAB SAMPLER (CLOW)
BMS

Go to a Cruise Information
Cruise ID: [＿＿＿＿] Go

Go to a Dive Information
Dive ID: [----▼] [＿＿＿＿] Go

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MIRAI MR14-02 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

ReadMe   **Observation Data**   **Data Format**

Cruise ID: **MR14-02**
Expendable Conductivity-Temperature-Depth Profiler (XCTD): Processed (DMO)-QCed
**Data Policy**: **JAMSTEC**

XCTD DMO

Format Description for the Corrected Data
Provided in the Exchange Format of CCHDO (CLIVAR and Carbon Hydrographic Data Office). Please see the following link for details of Exchange Format.
CCHDO | CLIVAR & Carbon Hydrographic Data Office

Data in following cruise is not expressed with Exchange Format. Please see the site of each cruise for format.
MR02-K05 Leg1
MR04-05

Format Description for the QCed 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	-	CR+LF

Data part

No.	Column	Content	Unit	Format	Remarks
1	1 - 11	Depth	m	f11.1	
2	12 - 22	Temperature	deg-C	f11.2	ITS-90
3	23 - 33	Salinity	PSU	f11.3	PSS-78
4	45 - 55	Flag	-	i11	1 - 7 : space 8 : flag of depth 9 : flag of temperature 10 : flag of salinity 11 : space * reference : **'Definition of Quality Control Flags'**
5	56 - 57	Terminator	-	-	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

QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure, additionally visually checked. Please see the site of NODC of the following link for quality control procedure.
QUALITY CONTROL AND PROCESSING OF HISTORICAL OCEANOGRAPHIC TEMPERATURE, SALINITY, AND OXYGEN DATA

Sample Program
ex_read2.f

Related Information

MR14-02
Ship Name: MIRAI
Period: 2014-02-15 - 2014-03-23
Chief Scientist: Takuya Hasegawa (JAMSTEC)
Project Name: [Tropical Ocean Climate Study (TOCS)]
Proposal ▶ Tropical Ocean Climate Study
Title:

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Update History

2019-08-31	An observation data was registerd.
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Last Modified: 2019-08-31

| ReadMe | **Observation Data** | Data Format |

Cruise ID: **MR14-02**
Expendable Conductivity-Temperature-Depth Profiler (XCTD): Processed (DMO)-QCed
Data Policy: **JAMSTEC**
Observation Items: Depth, Temperature, Salinity
Science Keywords:

| OCEANS | > OCEAN TEMPERATURE | > WATER TEMPERATURE |
| | OCEANS > SALINITY/DENSITY | > SALINITY |

Observation Map

1. Clicking the icon displays a balloon with observation information.
2. Then click the observation name, figures will be displayed.

Imagery reproduced from ...

—— ... Observation Line   —— ... Navigation   ⭘ ... Observation, Dive Point, Hole
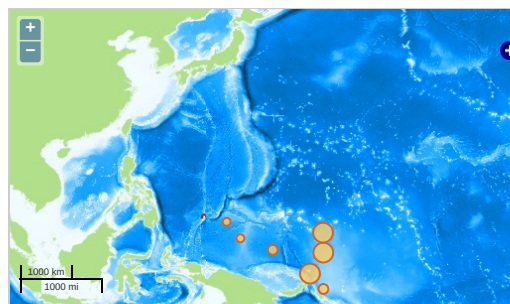
Figures

201402160420

MR14-02: 201402160420
Expendable Conductivity-Temperature-Depth Profiler (XCTD): Salinity
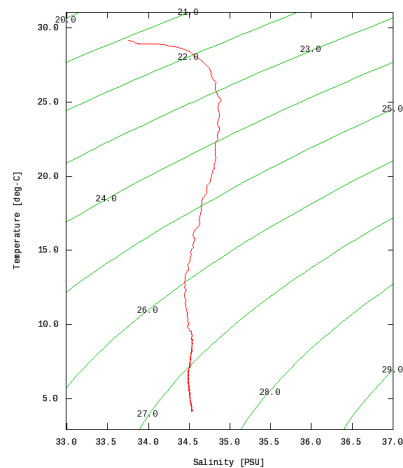
Only values evaluated as "good : all flags are 0" are plotted in profiles.
Please see Format Page for the definition of quality flags.

Data List

[Add to Basket]

☐	**File names**
☐	201402160420.dat
☐	201402171516.dat
☐	201402210335.dat
☐	201402230335.dat
☐	201402241749.dat
☐	201402241940.dat
☐	201402250706.dat
☐	201402250917.dat
☐	201402251127.dat
☐	201402251320.dat
☐	201402251617.dat
☐	201402252056.dat
☐	201402260006.dat
☐	201402260308.dat

- ☐ File names603.dat
- ☐ 201402260853.dat
- ☐ 201402261029.dat
- ☐ 201402261200.dat
- ☐ 201402261335.dat
- ☐ 201402261512.dat
- ☐ 201402270139.dat
- ☐ 201403010043.dat
- ☐ 201403030130.dat
- ☐ 201403050527.dat
- ☐ 201403070255.dat
- ☐ 201403070608.dat
- ☐ 201403080100.dat
- ☐ 201403080253.dat
- ☐ 201403090502.dat
- ☐ 201403100133.dat
- ☐ 201403100539.dat
- ☐ 201403101927.dat
- ☐ 201403110759.dat
- ☐ 201403111000.dat
- ☐ 201403111201.dat
- ☐ 201403111403.dat
- ☐ 201403111608.dat
- ☐ 201403111959.dat
- ☐ 201403112000.dat
- ☐ 201403112012.dat
- ☐ 201403112013.dat
- ☐ 201403112020.dat
- ☐ 201403112020_Hand.dat
- ☐ 201403112028.dat
- ☐ 201403112028_Hand.dat
- ☐ ex_read2.f (Sample Program)

- Observation List
  The list of observation is shown as follows.

Observation	Time and Date	Lat. [°]	Lon. [°]
201402160420	2014-02-16 04:21	6.9525	138.8318
201402171516	2014-02-17 15:24	4.0433	141.2858
201402210335	2014-02-21 03:37	1.9858	147.0301
201402230335	2014-02-23 03:37	-0.0165	147.0158
201402241749	2014-02-24 17:53	-2.2333	153.6306
201402241940	2014-02-24 19:42	-2.5011	153.4330
201402250706	2014-02-25 07:11	-2.8080	153.2621
201402250917	2014-02-25 09:20	-3.0503	153.0170
201402251127	2014-02-25 11:30	-3.3333	152.8171
201402251320	2014-02-25 13:23	-3.5995	152.6171
201402251617	2014-02-25 16:19	-3.8376	152.9326
201402252056	2014-02-25 20:57	-4.0880	153.2510
201402260006	2014-02-26 00:07	-4.3323	153.5654
201402260308	2014-02-26 03:09	-4.5701	153.8796
201402260603	2014-02-26 06:04	-4.7886	154.1481
201402260853	2014-02-26 08:57	-4.9980	154.4196
201402261029	2014-02-26 10:32	-4.9665	154.7335
201402261200	2014-02-26 12:04	-5.0001	155.0500
201402261335	2014-02-26 13:38	-5.0000	155.3666
201402261512	2014-02-26 15:15	-5.0008	155.6833
201402270139	2014-02-27 01:45	-4.9630	156.0266
201403010043	2014-03-01 00:44	-1.9888	156.0415
201403030130	2014-03-03 01:32	-0.0091	155.9753
201403050527	2014-03-05 05:28	-0.0538	156.1881
201403070255	2014-03-07 02:57	1.4996	156.0010
201403070608	2014-03-07 06:12	0.9980	156.0033
201403080100	2014-03-08 01:02	1.9573	156.0083
201403080253	2014-03-08 02:59	2.0500	156.0453
201403090502	2014-03-09 05:04	3.0016	155.9996
201403100133	2014-03-10 01:34	4.9618	156.0340
201403100539	2014-03-10 05:41	4.0008	156.0004
201403101927	2014-03-10 19:28	5.0350	155.9586
201403110759	2014-03-11 08:00	5.5008	155.9996
201403111000	2014-03-11 10:02	5.9998	155.9998
201403111201	2014-03-11 12:04	6.5001	155.9998
201403111403	2014-03-11 14:07	7.0000	156.0001
201403111608	2014-03-11 16:11	7.5000	156.0001
201403111959	2014-03-11 20:06	7.9611	156.0118
201403112000	2014-03-11 20:06	7.9611	156.0118
201403112012	2014-03-11 20:14	7.9611	156.0113
201403112013	2014-03-11 20:14	7.9611	156.0113
201403112020	2014-03-11 20:22	7.9611	156.0111
201403112020_Hand	2014-03-11 20:22	7.9611	156.0111
201403112028	2014-03-11 20:29	7.9610	156.0110
201403112028_Hand	2014-03-11 20:29	7.9610	156.0110

Related Information

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MR14-02
Ship Name: MIRAI
Period: 2014-02-15 - 2014-03-23
Chief Scientist: Takuya Hasegawa (JAMSTEC)
Project Name: [Tropical Ocean Climate Study (TOCS)]
Proposal ▸ Tropical Ocean Climate Study
Title:

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