

## MIRAI MR12-03 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

[ReadMe](#) [Observation Data](#) [Data Format](#)

Cruise ID: [MR12-03](#)

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/MR12-03\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR12-03_all.pdf)

### For Using Data

#### Principal Investigator

Data Management Office

#### Use Constraints

See [Terms and Conditions](#) about constrain of use.

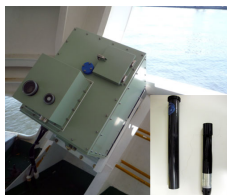
#### Data Citation

See [Terms and Conditions](#) about data citation.

### Instrument

Instrument:

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



### 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                                     |            |            |            |
| Measurement 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

In addition, coefficients of the air rate equation are different by probe type.

| 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 |
|--------------|------------------|------------|----------|-----------|
| 201207250648 | 12057601         | XCTD-1     | Auto     | MK-150N   |
| 201207260840 | 12057604         | XCTD-1     | Auto     | MK-150N   |
| 201207261116 | 12057605         | XCTD-1     | Auto     | MK-150N   |
| 201207261401 | 12057603         | XCTD-1     | Auto     | MK-150N   |
| 201207261639 | 12057602         | XCTD-1     | Auto     | MK-150N   |
| 201207280334 | 12057606         | XCTD-1     | Auto     | MK-150N   |
| 201207290117 | 12057607         | XCTD-1     | Auto     | MK-150N   |
| 201207312210 | 12057609         | XCTD-1     | Auto     | MK-150N   |
| 201208010003 | 12057608         | XCTD-1     | Auto     | MK-150N   |
| 201208010603 | 12057612         | XCTD-1     | Auto     | MK-150N   |
| 201208010746 | 12057611         | XCTD-1     | Auto     | MK-150N   |
| 201208010941 | 12057610         | XCTD-1     | Auto     | MK-150N   |
| 201208011136 | 12057613         | XCTD-1     | Auto     | MK-150N   |
| 201208020502 | 12057614         | XCTD-1     | Auto     | MK-150N   |
| 201208020707 | 12057618         | XCTD-1     | Auto     | MK-150N   |
| 201208020916 | 12057617         | XCTD-1     | Auto     | MK-150N   |
| 201208021123 | 12057621         | XCTD-1     | Auto     | MK-150N   |
| 201208021317 | 12057622         | XCTD-1     | Auto     | MK-150N   |
| 201208021518 | 12057615         | XCTD-1     | Auto     | MK-150N   |
| 201208021710 | 12057616         | XCTD-1     | Auto     | MK-150N   |
| 201208021858 | 12057619         | XCTD-1     | Auto     | MK-150N   |
| 201208022040 | 12057620         | XCTD-1     | Auto     | MK-150N   |
| 201208022223 | 12057623         | XCTD-1     | Auto     | MK-150N   |
| 201208041036 | 12057624         | XCTD-1     | Auto     | MK-150N   |
| 201208051041 | 12057626         | XCTD-1     | Auto     | MK-150N   |
| 201208051601 | 12057625         | XCTD-1     | Auto     | MK-150N   |
| 201208060803 | 11125642         | XCTD-1     | Auto     | MK-150N   |
| 201208100125 | 12036649         | XCTD-1     | Auto     | MK-150N   |
| 201208102320 | 12036650         | XCTD-1     | Auto     | MK-150N   |
| 201208160128 | 12057627         | XCTD-1     | Auto     | MK-150N   |
| 201208190122 | 12057628         | XCTD-1     | Auto     | MK-150N   |
| 201208190409 | 12057630         | XCTD-1     | Auto     | MK-150N   |
| 201208190654 | 12057629         | XCTD-1     | Auto     | MK-150N   |
| 201208190933 | 12057631         | XCTD-1     | Auto     | MK-150N   |
| 201208191208 | 12057632         | XCTD-1     | Auto     | MK-150N   |
| 201208191451 | 12057635         | XCTD-1     | Auto     | MK-150N   |
| 201208191837 | 12057634         | XCTD-1     | Auto     | MK-150N   |
| 201208191849 | 12057633         | XCTD-1     | Auto     | MK-150N   |
| 201208210138 | 12057636         | XCTD-1     | Auto     | MK-150N   |

**Data processing**

(1) For sensor's stability, 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.

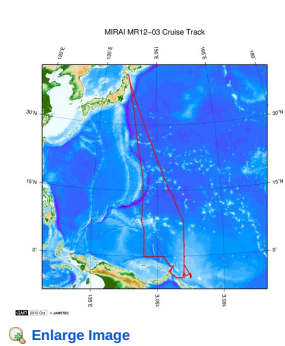
- 1) The gradient check of adjacent depth data
- 2) The density inversion check
- 3) The broad range check set up at given ocean space and depth

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.

**Related Information**



**MR12-03**  
Ship Name: MIRAI  
Period: 2012-07-16 - 2012-08-29  
Chief Scientist: Yuji Kashino (JAMSTEC)  
Project Name: [Tropical Ocean Climate Study (TOCS)]

| Update History |                                    |
|----------------|------------------------------------|
| 2019-08-31     | An observation data was registerd. |
| 2017-06-14     | An observation data was registerd. |
| 2015-05-22     | An observation data was registerd. |
| 2014-09-10     | An observation data was registerd. |

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Dive ID:

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**JAMSTEC**

国立研究開発法人  
海洋研究開発機構  
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## MIRAI MR12-03 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

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Cruise ID: [MR12-03](#)

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<br>8 : flag of depth<br>9 : flag of temperature<br>10 : flag of salinity<br>11 : space<br>* reference : <a href="#">Definition of Quality Control Flags</a> |
| 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

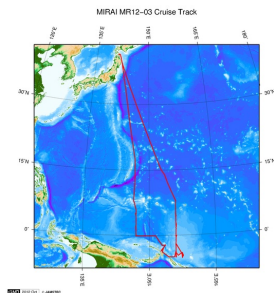
QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure, additionally visually checked. Please see the site of NODC of the following link for quality control procedure.

[QUALITY CONTROL AND PROCESSING OF HISTORICAL OCEANOGRAPHIC TEMPERATURE, SALINITY, AND OXYGEN DATA](#)

#### Sample Program

[ex\\_read2.f](#)

#### Related Information



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#### MR12-03

Ship Name: MIRAI

Period: 2012-07-16 - 2012-08-29

Chief Scientist: Yuji Kashino (JAMSTEC)

Project Name: [Tropical Ocean Climate Study (TOCS)]

#### Update History

|            |                                    |
|------------|------------------------------------|
| 2019-08-31 | An observation data was registerd. |
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KM-ROV  
POWER GRAB SAMPLER (SHELL)  
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BMS

#### Go to a Cruise Information

Cruise ID:

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## MIRAI MR12-03 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

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Cruise ID: **MR12-03**

Expendable Conductivity-Temperature-Depth Profiler (XCTD): Processed (DMO)-QCed

Data Policy: **JAMSTEC**

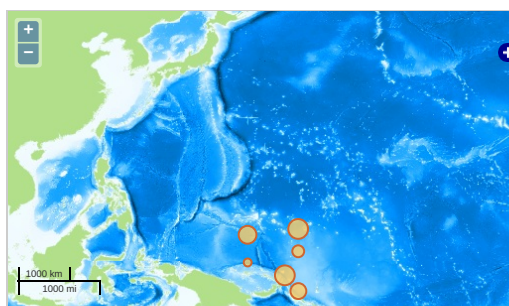
Observation Items: Depth, Temperature, Salinity

Science Keywords:

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

### Observation Map

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



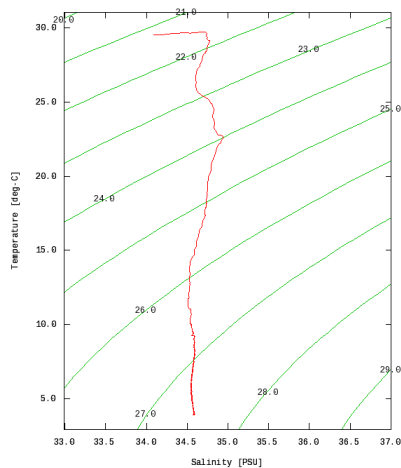
— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

### Figures

201207250648



MR12-03: 201207250648  
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

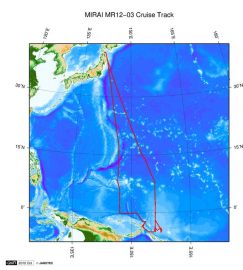
|                          |                  |
|--------------------------|------------------|
| <input type="checkbox"/> | 201207250648.dat |
| <input type="checkbox"/> | 201207260840.dat |
| <input type="checkbox"/> | 201207261116.dat |
| <input type="checkbox"/> | 201207261401.dat |
| <input type="checkbox"/> | 201207261639.dat |
| <input type="checkbox"/> | 201207280334.dat |
| <input type="checkbox"/> | 201207290117.dat |
| <input type="checkbox"/> | 201207312210.dat |
| <input type="checkbox"/> | 201208010003.dat |
| <input type="checkbox"/> | 201208010603.dat |
| <input type="checkbox"/> | 201208010746.dat |
| <input type="checkbox"/> | 201208010941.dat |
| <input type="checkbox"/> | 201208011136.dat |
| <input type="checkbox"/> | 201208020502.dat |

|   |
|---|
|  20120805707.dat              |
|  201208020916.dat            |
|  201208021123.dat            |
|  201208021317.dat            |
|  201208021518.dat            |
|  201208021710.dat            |
|  201208021858.dat            |
|  201208022040.dat            |
|  201208022223.dat            |
|  201208041036.dat            |
|  201208051041.dat            |
|  201208051601.dat            |
|  201208060803.dat            |
|  201208100125.dat            |
|  201208102320.dat            |
|  201208160128.dat            |
|  201208190122.dat            |
|  201208190409.dat            |
|  201208190654.dat            |
|  201208190933.dat            |
|  201208191208.dat            |
|  201208191451.dat            |
|  201208191837.dat            |
|  201208191849.dat            |
|  201208210138.dat            |
|  ex_read2.f (Sample Program) |

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

| Observation  | Time and Date    | Lat. [°] | Lon. [°] |
|--------------|------------------|----------|----------|
| 201207250648 | 2012-07-25 06:50 | 4.9666   | 147.0116 |
| 201207260840 | 2012-07-26 08:42 | 3.9993   | 147.0001 |
| 201207261116 | 2012-07-26 11:21 | 3.4996   | 146.9996 |
| 201207261401 | 2012-07-26 14:03 | 3.0000   | 146.9995 |
| 201207261639 | 2012-07-26 16:41 | 2.5000   | 146.9988 |
| 201207280334 | 2012-07-28 03:36 | 2.0728   | 146.9470 |
| 201207290117 | 2012-07-29 01:18 | 0.0535   | 147.0333 |
| 201207312210 | 2012-07-31 22:11 | -2.2336  | 153.6335 |
| 201208010003 | 2012-08-01 00:05 | -2.5003  | 153.4331 |
| 201208010603 | 2012-08-01 06:04 | -2.8051  | 153.2201 |
| 201208010746 | 2012-08-01 07:48 | -3.0500  | 153.0171 |
| 201208010941 | 2012-08-01 09:43 | -3.3333  | 152.8170 |
| 201208011136 | 2012-08-01 11:38 | -3.5995  | 152.6166 |
| 201208020502 | 2012-08-02 05:03 | -3.8373  | 152.9335 |
| 201208020707 | 2012-08-02 07:08 | -4.0880  | 153.2503 |
| 201208020916 | 2012-08-02 09:18 | -4.3320  | 153.5666 |
| 201208021123 | 2012-08-02 11:25 | -4.5718  | 153.8835 |
| 201208021317 | 2012-08-02 13:19 | -4.7906  | 154.1500 |
| 201208021518 | 2012-08-02 15:20 | -4.9980  | 154.4166 |
| 201208021710 | 2012-08-02 17:14 | -4.9661  | 154.7335 |
| 201208021858 | 2012-08-02 19:00 | -5.0001  | 155.0500 |
| 201208022040 | 2012-08-02 20:45 | -5.0001  | 155.3666 |
| 201208022223 | 2012-08-02 22:27 | -5.0000  | 155.6833 |
| 201208041036 | 2012-08-04 10:37 | -5.0321  | 156.0415 |
| 201208051041 | 2012-08-05 10:42 | -4.6498  | 156.5220 |
| 201208051601 | 2012-08-05 16:03 | -4.2666  | 157.4131 |
| 201208060803 | 2012-08-06 08:04 | -4.8363  | 157.4283 |
| 201208100125 | 2012-08-10 01:27 | -2.0170  | 155.9660 |
| 201208102320 | 2012-08-10 23:22 | 0.0036   | 156.0548 |
| 201208160128 | 2012-08-16 01:29 | 2.0371   | 156.0123 |
| 201208190122 | 2012-08-19 01:23 | 5.0176   | 155.9756 |
| 201208190409 | 2012-08-19 04:10 | 5.5000   | 156.0000 |
| 201208190654 | 2012-08-19 06:56 | 6.0025   | 156.0000 |
| 201208190933 | 2012-08-19 09:34 | 6.4995   | 156.0004 |
| 201208191208 | 2012-08-19 12:09 | 7.0033   | 155.9998 |
| 201208191451 | 2012-08-19 14:53 | 7.5000   | 155.9998 |
| 201208191837 | 2012-08-19 18:40 | 7.9766   | 156.0125 |
| 201208191849 | 2012-08-19 18:51 | 7.9768   | 156.0125 |
| 201208210138 | 2012-08-21 01:39 | 7.9648   | 156.0436 |

Related Information



[Enlarge Image](#)

#### MR12-03

Ship Name: MIRAI

Period: 2012-07-16 - 2012-08-29

Chief Scientist: Yuji Kashino (JAMSTEC)

Project Name: [Tropical Ocean Climate Study (TOCS)]

#### Update History

|            |                                     |
|------------|-------------------------------------|
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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)  
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