

## MIRAI MR16-06 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

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

Cruise ID: [MR16-06](#)

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/MR16-06\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR16-06_all.pdf)

### For Using Data

#### Principal Investigator

Data Management Office

#### Use Constraints

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

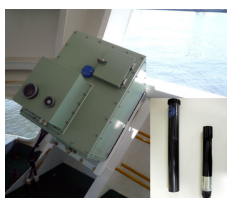
#### Data Citation

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

### Instrument

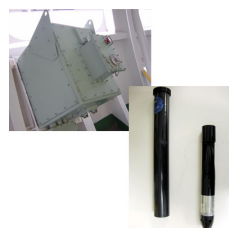
Instrument:

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			
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.

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

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
201609060147	15073001	XCTD-1	Auto	MK-150N
201609060242	15073002	XCTD-1	Auto	MK-150N
201609060334	15073010	XCTD-1	Auto	MK-150N
201609060426	15073007	XCTD-1	Auto	MK-150N
201609060429	15073003	XCTD-1	Auto	MK-150N
201609060517	15073011	XCTD-1	Auto	MK-150N
201609060633	15073018	XCTD-1	Hand	MK-150N
201609060719	15073013	XCTD-1	Hand	MK-150N
201609060808	15073012	XCTD-1	Auto	MK-150N
201609060901	15073008	XCTD-1	Auto	MK-150N
201609060955	15073005	XCTD-1	Auto	MK-150N
201609080343	15073009	XCTD-1	Auto	MK-150N
201609080733	15073021	XCTD-1	Auto	MK-150N
201609081111	15073019	XCTD-1	Auto	MK-150N
201609081215	15073014	XCTD-1	Auto	MK-150N
201609081221	15073022	XCTD-1	Auto	MK-150N
201609081408	15073015	XCTD-1	Auto	MK-150N
201609081537	15073016	XCTD-1	Auto	MK-150N
201609090448	15073017	XCTD-1	Auto	MK-150N
201609090834	16017196	XCTD-1	Auto	MK-150N
201609091223	16017193	XCTD-1	Auto	MK-150N
201609091625	15073004	XCTD-1	Auto	MK-150N
201609091741	15073023	XCTD-1	Auto	MK-150N
201609091943	16017199	XCTD-1	Auto	MK-150N
201609100734	15073020	XCTD-1	Auto	MK-150N
201609130632	16017195	XCTD-1	Auto	MK-150N
201609130950	16017197	XCTD-1	Auto	MK-150N
201609131343	16017191	XCTD-1	Auto	MK-150N
201609131646	16017198	XCTD-1	Auto	MK-150N
201609132308	16027268	XCTD-1	Auto	MK-150N
201609140319	16017194	XCTD-1	Auto	MK-150N
201609141011	16027270	XCTD-1	Auto	MK-150N
201609141356	16027271	XCTD-1	Auto	MK-150N
201609141831	16017200	XCTD-1	Auto	MK-150N
201609142255	16027272	XCTD-1	Auto	MK-150N
201609150217	16017192	XCTD-1	Auto	MK-150N
201609151421	16027269	XCTD-1	Auto	MK-150N
201609161105	16027273	XCTD-1	Auto	MK-150N
201609161225	16027282	XCTD-1	Auto	MK-150N
201609161324	16027281	XCTD-1	Auto	MK-150N
201609161423	16027274	XCTD-1	Auto	MK-150N
201609161525	16027278	XCTD-1	Auto	MK-150N
201609161637	16027291	XCTD-1	Hand	MK-150N
201609161722	16027292	XCTD-1	Hand	MK-150N
201609170914	16027290	XCTD-1	Hand	MK-150N
201609171123	16027286	XCTD-1	Hand	MK-150N
201609171209	16027288	XCTD-1	Hand	MK-150N
201609171307	16027289	XCTD-1	Hand	MK-150N
201609171401	16027317	XCTD-1	Hand	MK-150N
201609171458	16027318	XCTD-1	Hand	MK-150N
201609171558	16027319	XCTD-1	Hand	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.

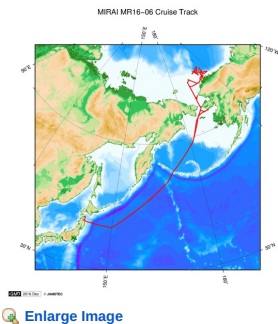
- 1) The gradient check of adjacent depth data
- 2) The density inversion check
- 3) The broad range check set up at given ocean space and depth

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**



#### MR16-06

Ship Name: MIRAI

Period: 2016-08-22 - 2016-10-05

Chief Scientist: Shigeto Nishino (JAMSTEC)

Project Name: [Arctic Ocean Climate System Research]

Proposal ▶ Predictability study on weather and sea-ice forecasts linked with user engagement

Title:

#### Update History

2019-08-31	An observation data was registered.
2018-10-31	An observation data was registered.

#### JAMSTEC

Site Policy

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Application for Data and Samples

Data Policy

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#### Data

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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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**JAMSTEC**

国立研究開発法人  
海洋研究開発機構  
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY

## MIRAI MR16-06 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

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

 Cruise ID: [MR16-06](#)

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 : <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

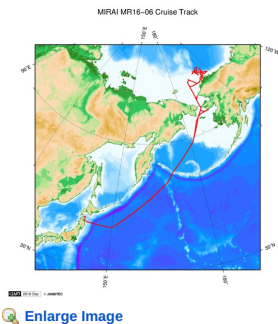
QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure, additionally visually checked. Please see the site of NODC of the following link for quality control procedure.

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

#### Sample Program

[ex\\_read2.f](#)

#### Related Information



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Ship Name: MIRAI

Period: 2016-08-22 - 2016-10-05

Chief Scientist: Shigeto Nishino (JAMSTEC)

Project Name: [Arctic Ocean Climate System Reaserch]

Proposal ▶ Predictability study on weather and sea-ice forecasts linked with user engagement

Title:

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KM-ROV

POWER GRAB SAMPLER

(SHELL)

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(CLOW)

BMS

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:

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海洋研究開発機構  
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY

## MIRAI MR16-06 Expendable Conductivity-Temperature-Depth Profiler (XCTD)

Last Modified: 2019-08-31

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

Cruise ID: **MR16-06**

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

Data Policy: **JAMSTEC**

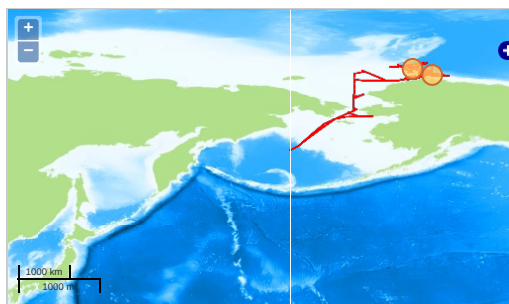
Observation Items: Depth, Temperature, Salinity

Science Keywords:

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

### Observation Map

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



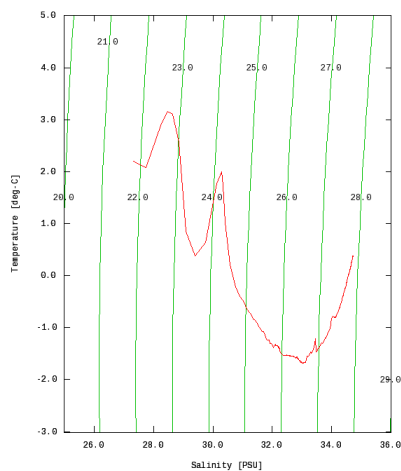
— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

### Figures

201609060147



MR16-06: 201609060147  
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

☐ 201609060147.dat  
☐ 201609060242.dat  
☐ 201609060334.dat  
☐ 201609060426.dat  
☐ 201609060429.dat  
☐ 201609060517.dat  
☐ 201609060633.dat  
☐ 201609060719.dat  
☐ 201609060808.dat  
☐ 201609060901.dat  
☐ 201609060955.dat  
☐ 201609080343.dat  
☐ 201609080733.dat  
☐ 201609081111.dat

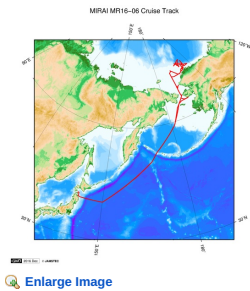
	20160908215.dat
	201609081221.dat
	201609081408.dat
	201609081537.dat
	201609090448.dat
	201609090834.dat
	201609091223.dat
	201609091625.dat
	201609091741.dat
	201609091943.dat
	201609100734.dat
	201609130632.dat
	201609130950.dat
	201609131343.dat
	201609131646.dat
	201609132308.dat
	201609140319.dat
	201609141011.dat
	201609141356.dat
	201609141831.dat
	201609142255.dat
	201609150217.dat
	201609151421.dat
	201609161105.dat
	201609161225.dat
	201609161324.dat
	201609161423.dat
	201609161525.dat
	201609161637.dat
	201609161722.dat
	201609170914.dat
	201609171123.dat
	201609171209.dat
	201609171307.dat
	201609171401.dat
	201609171458.dat
	201609171558.dat
	ex_read2.f (Sample Program)

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

Observation	Time and Date	Lat. [°]	Lon. [°]
201609060147	2016-09-06 01:51	71.8331	-155.0000
201609060242	2016-09-06 02:43	72.0000	-154.9991
201609060334	2016-09-06 03:36	72.1666	-154.9995
201609060426	2016-09-06 04:28	72.3333	-154.9985
201609060429	2016-09-06 04:31	72.3416	-154.9988
201609060517	2016-09-06 05:19	72.5001	-154.9965
201609060633	2016-09-06 06:34	72.7105	-154.9980
201609060719	2016-09-06 07:21	72.8500	-154.9991
201609060808	2016-09-06 08:10	73.0000	-155.0081
201609060901	2016-09-06 09:03	73.1666	-155.0003
201609060955	2016-09-06 09:57	73.3335	-155.0028
201609080343	2016-09-08 03:45	71.6830	-152.5004
201609080733	2016-09-08 07:35	71.7813	-153.0310
201609081111	2016-09-08 11:14	72.0121	-154.5036
201609081215	2016-09-08 12:16	72.0669	-155.0015
201609081221	2016-09-08 12:22	72.0710	-155.0411
201609081408	2016-09-08 14:09	72.1740	-155.4995
201609081537	2016-09-08 15:38	72.3228	-155.4521
201609090448	2016-09-09 04:50	72.3755	-155.7035
201609090834	2016-09-09 08:36	72.3780	-156.5013
201609091223	2016-09-09 12:25	72.6275	-157.4990
201609091625	2016-09-09 16:26	72.9196	-158.4988
201609091741	2016-09-09 17:43	73.0516	-158.9991
201609091943	2016-09-09 19:44	73.2483	-159.9141
201609100734	2016-09-10 07:35	73.4043	-160.4511
201609130632	2016-09-13 06:34	72.9166	-158.6661
201609130950	2016-09-13 09:52	73.0835	-158.2490
201609131343	2016-09-13 13:45	73.2496	-157.7541
201609131646	2016-09-13 16:48	73.4170	-157.2485
201609132308	2016-09-13 23:10	73.6260	-156.5826
201609140319	2016-09-14 03:21	73.8751	-155.7561
201609141011	2016-09-14 10:13	73.7856	-157.1775
201609141356	2016-09-14 13:58	73.6673	-158.1056
201609141831	2016-09-14 18:33	73.5661	-158.8786
201609142255	2016-09-14 22:57	73.4491	-159.7326
201609150217	2016-09-15 02:18	73.3456	-160.4800
201609151421	2016-09-15 14:23	73.2666	-161.0538
201609161105	2016-09-16 11:07	73.3755	-158.8330
201609161225	2016-09-16 12:27	73.2481	-158.3328
201609161324	2016-09-16 13:26	73.1255	-157.8333
201609161423	2016-09-16 14:26	72.9991	-157.3323

Observation	Time and Date	Lat/Lon	Lat/Lon
201609161325	2016-09-16 13:27	72.6174	158.8336
201609161637	2016-09-16 16:39	72.7255	-156.2360
201609161722	2016-09-16 17:25	72.6260	-155.8425
201609170914	2016-09-17 09:16	72.1656	-155.9610
201609171123	2016-09-17 11:25	72.1670	-156.6995
201609171209	2016-09-17 12:13	72.1668	-157.1896
201609171307	2016-09-17 13:09	72.0000	-157.1903
201609171401	2016-09-17 14:03	71.8335	-157.1891
201609171458	2016-09-17 15:00	71.6688	-157.1846
201609171558	2016-09-17 16:01	71.5185	-157.1651

#### Related Information



**MR16-06**  
Ship Name: MIRAI  
Period: 2016-08-22 - 2016-10-05  
Chief Scientist: Shigeto Nishino (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Reaserch]  
Proposal ▶ Predictability study on weather and sea-ice forecasts linked with user engagement  
Title:

#### Update History

2019-08-31	An observation data was registered.
2018-10-31	An observation data was registered.

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Information of the Ships  
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KAIYO  
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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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JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY