

MIRAI MR02-K03 Expendable Bathythermograph (XBT)

Last Modified: 2019-09-28

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Cruise ID: [MR02-K03](#)

Expendable Bathythermograph (XBT): Processed (DMO)-QCed

Data Policy: [JAMSTEC](#)

Observation Items: Depth, Temperature

Science Keywords:

OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE

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 bathythermograph (XBT) (
- MR11-E02)



Overview

Using XBT (eXpendable Bathy Thermograph) system, the vertical distribution of water temperature is observed during free fall of its probe part in the seawater. On board, the analogue signal is converted to the temperature by data processor and the data is stored in PC. Depth data is calculated from the elapsed time.

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 : 50 msec

(3) XBT probe specifications

Probe Type	TSK T-5	TSK T-6	TSK T-7	TSK T-10
Temperature range [deg-C]	-2 to 35			
Temperature accuracy [deg-C]	+/- 0.2			
Temperature resolution [deg-C]	0.01			
Measurement depth [m]	1830	460	760	300
Depth accuracy [m]	5 or +/- 2% of depth; whichever is larger			
Maximum elapsed time [sec]	291	73	123	48
Rated ship speed [knot]	6	15	15	10

Since XBT 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 T-5	TSK T-6	TSK T-7	TSK T-10
Coefficient-a	6.828	6.691	6.691	6.301
Coefficient-b	-1.82	-2.25	-2.25	-2.16

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

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

Cast name	Probe Serial No.	Probe Type	Launcher	Converter
200206032249	-	T-5	Auto	MK-30N
200206040021	-	T-5	Auto	MK-30N
200206040230	-	T-5	Auto	MK-30N
200206040418	-	T-5	Auto	MK-30N
200206040605	-	T-5	Auto	MK-30N
200206040745	-	T-5	Auto	MK-30N
200206040927	-	T-5	Auto	MK-30N
200206041113	-	T-5	Auto	MK-30N
200206041350	-	T-5	Auto	MK-30N
200206041439	-	T-5	Auto	MK-30N
200206041526	-	T-5	Auto	MK-30N
200206041614	-	T-5	Auto	MK-30N
200206041659	-	T-5	Auto	MK-30N
200206041750	-	T-5	Auto	MK-30N
200206041835	-	T-5	Auto	MK-30N
200206090209	-	T-7	Auto	MK-30N
200206091446	-	T-7	Auto	MK-30N
200206091612	-	T-7	Auto	MK-30N
200206091737	-	T-7	Auto	MK-30N
200206091858	-	T-7	-	MK-30N
200206092019	-	T-7	Auto	MK-30N
200206092145	-	T-7	Auto	MK-30N
200206100844	-	T-7	Auto	MK-30N
200206101003	-	T-7	Auto	MK-30N
200206101121	-	T-7	-	MK-30N
200206101237	-	T-7	-	MK-30N
200206130900	-	T-7	-	MK-30N
200206130932	-	T-7	-	MK-30N
200206131003	-	T-7	-	MK-30N
200206131034	-	T-7	-	MK-30N
200206131104	-	T-7	-	MK-30N
200206131136	-	T-7	-	MK-30N
200206131208	-	T-7	-	MK-30N
200206131239	-	T-7	-	MK-30N
200206131310	-	T-7	-	MK-30N
200206131344	-	T-7	-	MK-30N
200206131418	-	T-7	-	MK-30N
200206131452	-	T-7	-	MK-30N
200206131531	-	T-7	-	MK-30N
200206131606	-	T-7	-	MK-30N
200206131641	-	T-7	-	MK-30N
200206131715	-	T-7	-	MK-30N
200206131749	-	T-7	-	MK-30N
200206131823	-	T-7	-	MK-30N
200206131857	-	T-7	-	MK-30N
200206131932	-	T-7	Auto	MK-30N
200206132006	-	T-7	Auto	MK-30N
200206140617	-	T-7	Auto	MK-30N
200206140719	-	T-7	Auto	MK-30N
200206140818	-	T-7	-	MK-30N
200206140923	-	T-7	Auto	MK-30N
200206141027	-	T-7	Auto	MK-30N
200206141136	-	T-7	-	MK-30N
200206141236	-	T-7	-	MK-30N
200206141336	-	T-7	-	MK-30N
200206141434	-	T-7	Auto	MK-30N
200206141534	-	T-7	Auto	MK-30N
200206141636	-	T-7	Auto	MK-30N
200206141745	-	T-7	Auto	MK-30N
200206141844	-	T-7	Auto	MK-30N
200206141947	-	T-7	Auto	MK-30N
200206142053	-	T-7	Auto	MK-30N
200206142205	-	T-7	-	MK-30N
200206181253	-	T-7	Auto	MK-30N
200206181332	-	T-7	Auto	MK-30N
200206181428	-	T-7	Auto	MK-30N

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.

- 1) The gradient check of adjacent depth data
- 2) 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

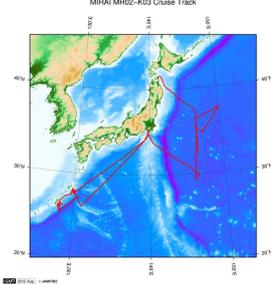
In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.

Note

(1) It is reported that T-5 probes produced by Tsurumi Seiki Co. Ltd. (TSK T-5 probes) have a fall-rate bias. Please see the following about publication policy of XBT fall-rate bias correction data.

[Publication policy of XBT fall-rate bias correction data](#)

Related Information



MIRAI MR02-K03 Cruise Track

MR02-K03
Ship Name: MIRAI
Period: 2002-05-26 - 2002-06-21
Chief Scientist: Yasushi Yoshikawa (JAMSTEC)

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Update History

2019-09-28	An observation data was registerd.
2017-06-29	An observation data was registerd.
2014-07-18	An observation data was registerd.
2014-02-20	An observation data was registerd.
2012-12-25	An observation data was registerd.

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[6K Camera DEEP TOW](#)
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Expendable Bathythermograph (XBT): Processed (DMO)-QCed

Data Policy: [JAMSTEC](#)

XBT DMO

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	XBT
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	45 - 55	Flag	-	i11	1 - 7 : space 8 : flag of depth 9 : flag of temperature 10 - 11 : space * reference : 'Definition of Quality Control Flags'
4	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

* Range and gradient check is performed to XBT data.

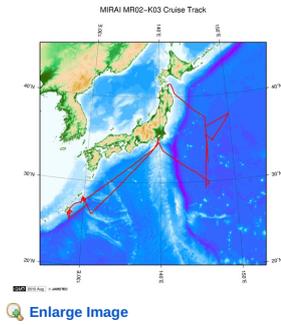
QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure, additionally visually checked. Please see the site of NODC of the following link for quality control procedure.

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

Sample Program

[ex_read2.f](#)

Related Information



MR02-K03
 Ship Name: MIRAI
 Period: 2002-05-26 - 2002-06-21
 Chief Scientist: Yasushi Yoshikawa (JAMSTEC)

Update History

2019-09-28	An observation data was registered.
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MIRAI MR02-K03 Expendable Bathythermograph (XBT)

Last Modified: 2019-09-28

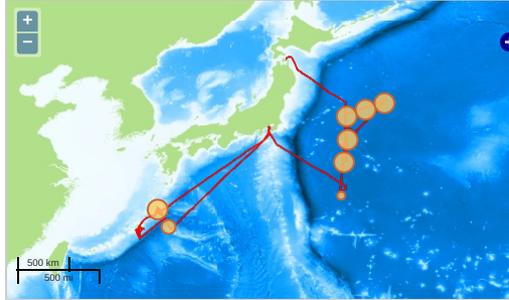
ReadMe **Observation Data** Data Format

Cruise ID: **MR02-K03**
 Expendable Bathythermograph (XBT): Processed (DMO)-QCed
 Data Policy: **JAMSTEC**
 Observation Items: Depth, Temperature
 Science Keywords:

OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE

Observation Map

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



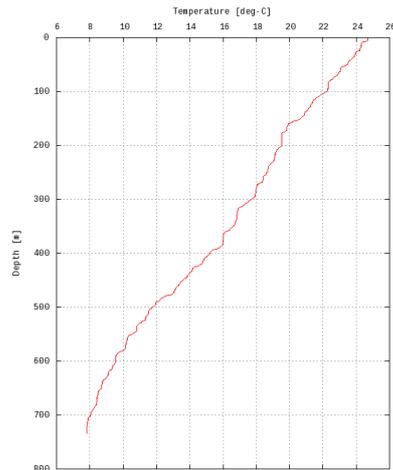
— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

Imagery reproduced from ...

Figures

200206032249

MR02-K03: 200206032249
 Expendable Bathythermograph (XBT): Temperature



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

File names
<input type="checkbox"/> 200206032249.dat
<input type="checkbox"/> 200206040021.dat
<input type="checkbox"/> 200206040230.dat
<input type="checkbox"/> 200206040418.dat
<input type="checkbox"/> 200206040605.dat
<input type="checkbox"/> 200206040745.dat
<input type="checkbox"/> 200206040927.dat
<input type="checkbox"/> 200206041113.dat
<input type="checkbox"/> 200206041350.dat
<input type="checkbox"/> 200206041439.dat
<input type="checkbox"/> 200206041526.dat
<input type="checkbox"/> 200206041614.dat
<input type="checkbox"/> 200206041659.dat
<input type="checkbox"/> 200206041750.dat
<input type="checkbox"/> 200206041835.dat
<input type="checkbox"/> 200206090209.dat
<input type="checkbox"/> 200206091446.dat
<input type="checkbox"/> 200206091612.dat
<input type="checkbox"/> 200206091737.dat

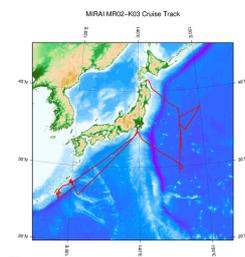
200206031958.dat
200206092019.dat
200206092145.dat
200206100844.dat
200206101003.dat
200206101121.dat
200206101237.dat
200206130900.dat
200206130932.dat
200206131003.dat
200206131034.dat
200206131104.dat
200206131136.dat
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200206141844.dat
200206141947.dat
200206142053.dat
200206142205.dat
200206181253.dat
200206181332.dat
200206181428.dat
ex_read2.f (Sample Program)

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

Observation	Time and Date	Lat. [°]	Lon. [°]
200206032249	2002-06-03 22:42	28.1310	129.8166
200206040021	2002-06-04 00:14	28.0173	129.9075
200206040230	2002-06-04 02:24	27.8338	129.9996
200206040418	2002-06-04 04:10	27.6953	130.0860
200206040605	2002-06-04 05:59	27.5526	130.1735
200206040745	2002-06-04 07:38	27.4126	130.2600
200206040927	2002-06-04 09:20	27.2728	130.3458
200206041113	2002-06-04 11:07	27.1340	130.4336
200206041350	2002-06-04 13:44	26.9968	130.5175
200206041439	2002-06-04 14:32	26.8588	130.6045
200206041526	2002-06-04 15:20	26.7195	130.6895
200206041614	2002-06-04 16:07	26.5818	130.7769
200206041659	2002-06-04 16:53	26.4426	130.8606
200206041750	2002-06-04 17:42	26.3075	130.9475
200206041835	2002-06-04 18:29	26.1666	131.0315
200206090209	2002-06-09 02:06	29.3675	146.0158
200206091446	2002-06-09 14:43	32.3348	146.2613
200206091612	2002-06-09 16:09	32.6674	146.2971
200206091737	2002-06-09 17:34	33.0008	146.3356
200206091858	2002-06-09 18:56	33.3336	146.3753
200206092019	2002-06-09 20:16	33.6674	146.3976
200206092145	2002-06-09 21:43	34.0003	146.4338
200206100844	2002-06-10 08:42	34.3326	146.5813
200206101003	2002-06-10 10:01	34.6666	146.5408
200206101121	2002-06-10 11:19	35.0008	146.4875
200206101237	2002-06-10 12:35	35.3333	146.4471
200206130900	2002-06-13 08:58	37.5978	149.8333
200206130932	2002-06-13 09:29	37.5356	149.6658
200206131003	2002-06-13 10:00	37.4778	149.5004
200206131034	2002-06-13 10:31	37.4208	149.3333
200206131104	2002-06-13 11:02	37.3671	149.1666

Observation ID	Time and Date	Lat [°N]	Long [°E]
200206131208	2002-06-13 12:06	37.2541	148.8331
200206131239	2002-06-13 12:37	37.1968	148.6670
200206131310	2002-06-13 13:08	37.1423	148.5000
200206131344	2002-06-13 13:42	37.0775	148.3336
200206131418	2002-06-13 14:16	37.0163	148.1668
200206131452	2002-06-13 14:50	36.9583	148.0003
200206131531	2002-06-13 15:29	36.8805	147.8330
200206131606	2002-06-13 16:04	36.8158	147.6663
200206131641	2002-06-13 16:38	36.7576	147.4996
200206131715	2002-06-13 17:13	36.6988	147.3330
200206131749	2002-06-13 17:47	36.6375	147.1665
200206131823	2002-06-13 18:21	36.5826	146.9998
200206131857	2002-06-13 18:55	36.5268	146.8330
200206131932	2002-06-13 19:28	36.4741	146.6671
200206132006	2002-06-13 20:03	36.4151	146.5045
200206140617	2002-06-14 06:15	35.9875	146.5105
200206140719	2002-06-14 07:17	35.7435	146.5096
200206140818	2002-06-14 08:16	35.5005	146.5013
200206140923	2002-06-14 09:21	35.2500	146.5011
200206141027	2002-06-14 10:25	34.9998	146.5033
200206141136	2002-06-14 11:34	34.7506	146.5015
200206141236	2002-06-14 12:34	34.5003	146.5045
200206141336	2002-06-14 13:34	34.2501	146.5038
200206141434	2002-06-14 14:32	34.0000	146.5050
200206141534	2002-06-14 15:32	33.7498	146.5051
200206141636	2002-06-14 16:33	33.5006	146.5040
200206141745	2002-06-14 17:43	33.2321	146.4996
200206141844	2002-06-14 18:41	33.0000	146.5026
200206141947	2002-06-14 19:45	32.7506	146.4955
200206142053	2002-06-14 20:51	32.5000	146.5091
200206142205	2002-06-14 22:03	32.2518	146.5006
200206181253	2002-06-18 12:45	37.0705	146.4983
200206181332	2002-06-18 13:30	37.2506	146.4991
200206181428	2002-06-18 14:26	37.5010	146.5003

Related Information



[Enlarge Image](#)

MR02-K03

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 Chief Scientist: Yasushi Yoshikawa (JAMSTEC)

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