

MIRAI MR00-K06 Expendable Bathythermograph (XBT)

Last Modified: 2019-09-28

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Cruise ID: [MR00-K06](#)

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
200009140731	-	T-7	-	MK-30N
200009140805	-	T-7	-	MK-30N
200009141539	-	T-7	-	MK-30N
200009141734	-	T-7	-	MK-30N
200009141803	-	T-7	-	MK-30N
200009141836	-	T-7	-	MK-30N
200009141909	-	T-7	-	MK-30N
200009141944	-	T-7	-	MK-30N
200009230115	-	T-7	-	MK-30N
200009230258	-	T-7	-	MK-30N
200009230343	-	T-7	-	MK-30N
200009230533	-	T-7	-	MK-30N
200009230620	-	T-7	-	MK-30N
200009231240	-	T-7	-	MK-30N
200009231658	-	T-7	-	MK-30N
200009231748	-	T-7	-	MK-30N
200009231833	-	T-7	-	MK-30N
200009232009	-	T-7	-	MK-30N
200009232058	-	T-7	-	MK-30N
200009262016	-	T-7	Auto	MK-30N
200009262020	-	T-7	Auto	MK-30N
200009262024	-	T-7	Auto	MK-30N
200009262028	-	T-7	Auto	MK-30N
200009262033	-	T-7	Auto	MK-30N
200009262037	-	T-7	Auto	MK-30N
200009262044	-	T-7	Auto	MK-30N
200009262047	-	T-7	Auto	MK-30N
200009262052	-	T-7	Auto	MK-30N
200010021033	-	T-7	Auto	MK-30N
200010021303	-	T-7	Auto	MK-30N
200010021542	-	T-7	-	MK-30N
200010021823	-	T-7	-	MK-30N
200010022218	-	T-7	-	MK-30N
200010030048	-	T-7	-	MK-30N
200010030319	-	T-7	-	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](#)

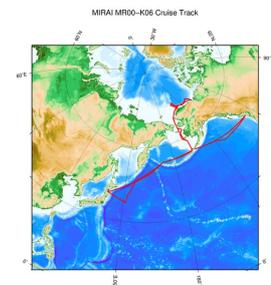
In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.

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



MR00-K06

Ship Name: MIRAI
 Period: 2000-08-03 - 2000-10-13
 Chief Scientist: Takatoshi Takizawa (JAMSTEC)
 Project Name: [Arctic Ocean Climate System Research]

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Update History

2019-09-28	An observation data was registerd.
2017-06-29	An observation data was registerd.
2014-07-12	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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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.

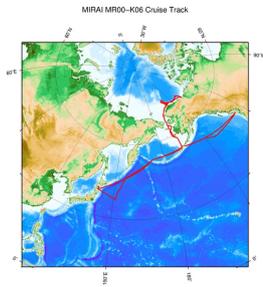
QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure, additionally visually checked. Please see the site of NODC of the following link for quality control procedure.

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

Sample Program

[ex_read2.f](#)

Related Information



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MR00-K06

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 Chief Scientist: Takatoshi Takizawa (JAMSTEC)
 Project Name: [Arctic Ocean Climate System Research]

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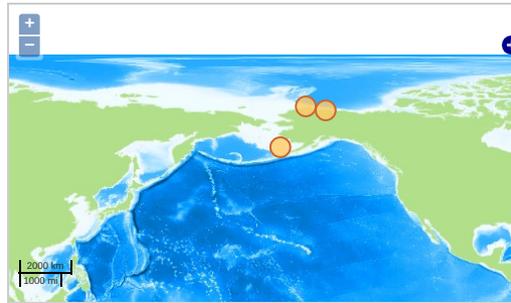
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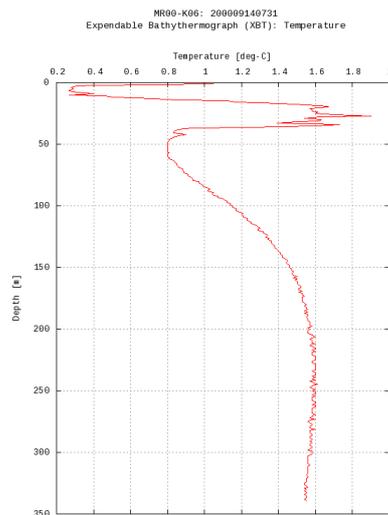
Observation Map

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



Figures

200009140731



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

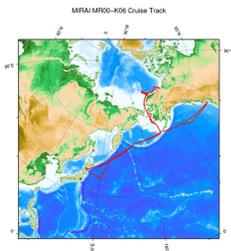
<input type="checkbox"/>	File names
<input type="checkbox"/>	200009140731.dat
<input type="checkbox"/>	200009140805.dat
<input type="checkbox"/>	200009141539.dat
<input type="checkbox"/>	200009141734.dat
<input type="checkbox"/>	200009141803.dat
<input type="checkbox"/>	200009141836.dat
<input type="checkbox"/>	200009141909.dat
<input type="checkbox"/>	200009141944.dat
<input type="checkbox"/>	200009230115.dat
<input type="checkbox"/>	200009230258.dat
<input type="checkbox"/>	200009230343.dat
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<input type="checkbox"/>	200009231658.dat
<input type="checkbox"/>	200009231748.dat
<input type="checkbox"/>	200009231833.dat
<input type="checkbox"/>	200009232009.dat
<input type="checkbox"/>	200009232058.dat

<input type="checkbox"/>	200009262016.dat
<input type="checkbox"/>	200009262020.dat
<input type="checkbox"/>	200009262024.dat
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<input type="checkbox"/>	200009262052.dat
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<input type="checkbox"/>	200010021823.dat
<input type="checkbox"/>	200010022218.dat
<input type="checkbox"/>	200010030048.dat
<input type="checkbox"/>	200010030319.dat
<input type="checkbox"/>	ex_read2.f (Sample Program)

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

Observation	Time and Date	Lat. [°]	Lon. [°]
200009140731	2000-09-14 07:27	71.1190	-149.9995
200009140805	2000-09-14 08:00	71.0978	-149.6645
200009141539	2000-09-14 15:34	71.1111	-149.3313
200009141734	2000-09-14 17:29	71.1498	-148.6513
200009141803	2000-09-14 17:59	71.1510	-148.3361
200009141836	2000-09-14 18:33	71.1456	-147.9986
200009141909	2000-09-14 19:06	71.1553	-147.6655
200009141944	2000-09-14 19:41	71.1889	-147.3343
200009230115	2000-09-23 01:11	72.2158	-155.5071
200009230258	2000-09-23 02:55	72.3263	-156.0101
200009230343	2000-09-23 03:40	72.4140	-156.4235
200009230533	2000-09-23 05:29	72.5395	-156.9973
200009230620	2000-09-23 06:16	72.6670	-157.5089
200009231240	2000-09-23 12:32	72.9111	-158.0048
200009231658	2000-09-23 16:55	72.9161	-158.5105
200009231748	2000-09-23 17:45	73.0375	-158.9983
200009231833	2000-09-23 18:31	73.1693	-159.4990
200009232009	2000-09-23 20:06	73.2576	-160.0060
200009232058	2000-09-23 20:55	73.3415	-160.4976
200009262016	2000-09-26 20:14	71.8996	-153.4840
200009262020	2000-09-26 20:18	71.8914	-153.4820
200009262024	2000-09-26 20:22	71.8788	-153.4811
200009262028	2000-09-26 20:26	71.8653	-153.4795
200009262033	2000-09-26 20:31	71.8530	-153.4798
200009262037	2000-09-26 20:35	71.8395	-153.4800
200009262044	2000-09-26 20:42	71.8210	-153.4860
200009262047	2000-09-26 20:46	71.8105	-153.4845
200009262052	2000-09-26 20:49	71.8076	-153.4855
200010021033	2000-10-02 10:31	58.0005	-166.0073
200010021303	2000-10-02 13:01	57.4990	-166.0143
200010021542	2000-10-02 15:40	56.9996	-166.0035
200010021823	2000-10-02 18:21	56.4998	-165.9908
200010022218	2000-10-02 22:15	55.9995	-166.0018
200010030048	2000-10-03 00:46	55.4995	-166.0171
200010030319	2000-10-03 03:16	54.9996	-166.0080

Related Information



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