

NATSUSHIMA NT09-20 Expendable Bathythermograph (XBT)

Last Modified: 2019-09-18

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Cruise ID: [NT09-20](#)

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:

XBT



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

(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
BT-034320091209	-	T-5	Hand	MK-30N
BT-034420091212	-	T-5	Hand	MK-30N
BT-034520091214	-	T-5	Hand	MK-30N

Cast name	Probe Serial No.	Probe Type	Launcher	Converter
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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.

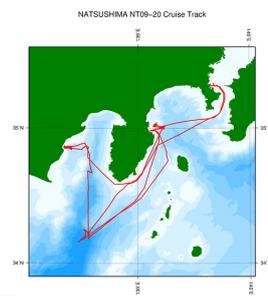
Note

(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

Cruise Data Dive Data



[Enlarge Image](#)

NT09-20

Ship Name: NATSUSHIMA

Period: 2009-12-08 - 2009-12-16

Chief Scientist: Fujio Yamamoto (JAMSTEC)

Update History

2019-09-18	An observation data was registerd.
2017-06-23	An observation data was registerd.
2014-09-04	An observation data was registerd.
2014-03-12	An observation data was registerd.
2012-09-28	An observation data was registerd.

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6K Camera DEEP TOW
6K Sonar DEEP TOW
KM-ROV
POWER GRAB SAMPLER (SHELL)
POWER GRAB SAMPLER (CLOW)
BMS

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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.

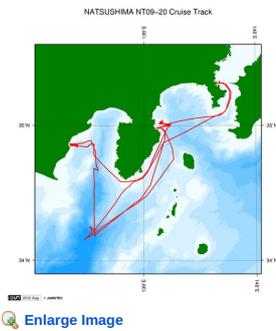
[QUALITY CONTROL AND PROCESSING OF HISTORICAL OCEANOGRAPHIC TEMPERATURE, SALINITY, AND OXYGEN DATA](#)

Sample Program

[ex_read2.f](#)

Related Information

- Cruise Data Dive Data



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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.



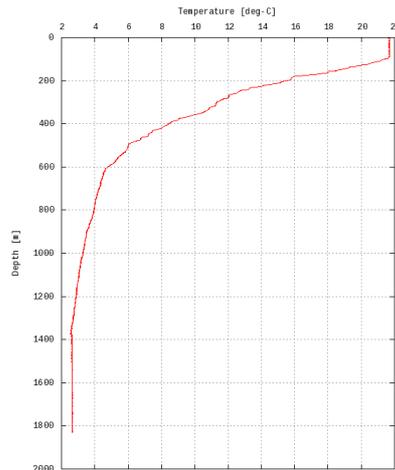
— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

Imagery reproduced from ...

Figures

BT-034320091209

NT09-20: BT-034320091209
 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

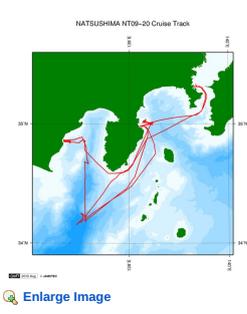
- File names
- BT-034320091209.dat
- BT-034420091212.dat
- BT-034520091214.dat
- ex_read2.f (Sample Program)

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

Observation	Time and Date	Lat. [°]	Lon. [°]
BT-034320091209	2009-12-09 21:47	35.0121	139.2421
BT-034420091212	2009-12-12 19:57	34.8473	138.4498
BT-034520091214	2009-12-14 21:28	34.1825	138.5681

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