

## NATSUSHIMA NT09-02 Leg2 Expendable Bathythermograph (XBT)

Last Modified: 2019-09-18

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

Cruise ID: [NT09-02 Leg2](#)

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

Data Policy: [JAMSTEC](#)

Observation Items: Depth, Temperature

Science Keywords:

OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/NT09-02\\_leg2\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/NT09-02_leg2_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:

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.

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

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 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 022120000210 |                  | T-5        | Hand     | MK 20A    |

#### 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.

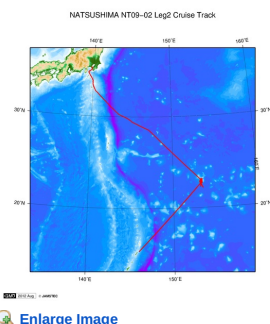
#### Note

(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



#### NT09-02 Leg2

Ship Name: NATSUSHIMA

Period: 2009-02-07 - 2009-02-24

Chief Scientist: Tetsuro Urabe (The University of Tokyo)

Proposal Title: Formation and metal-enrichment of ferromanganese crust as an interplay among fluid convection, seafloor environment and microbial activity of seamount in western Pacific basin

#### Update History

|            |                                     |
|------------|-------------------------------------|
| 2019-09-18 | An observation data was registered. |
| 2017-06-23 | An observation data was registered. |
| 2014-09-04 | An observation data was registered. |
| 2014-03-11 | An observation data was registered. |
| 2012-09-28 | An observation data was registered. |

#### JAMSTEC

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KM-ROV  
POWER GRAB SAMPLER (SHELL)  
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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<br>8 : flag of depth<br>9 : flag of temperature<br>10 - 11 : space<br>* reference : <a href="#">Definition of Quality Control Flags</a> |
| 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.

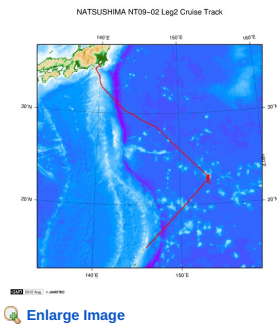
[QUALITY CONTROL AND PROCESSING OF HISTORICAL OCEANOGRAPHIC TEMPERATURE, SALINITY, AND OXYGEN DATA](#)

#### Sample Program

[ex\\_read2.f](#)

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Dive ID:

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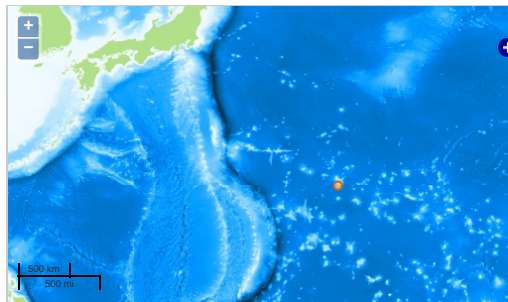
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### Observation Map

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

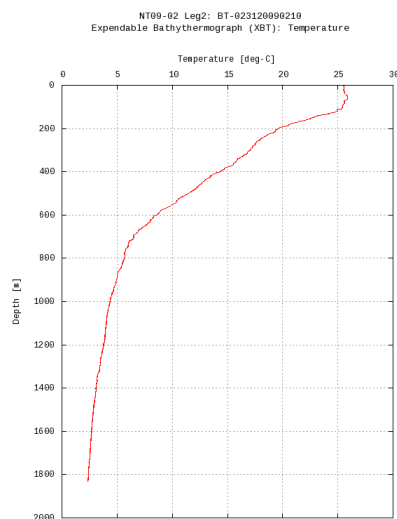


— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

Imagery reproduced from ...

### Figures

BT-023120090210



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-023120090210.dat

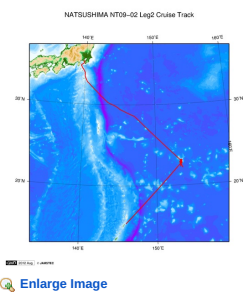
☐ ex\_read2.f (Sample Program)

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

| Observation     | Time and Date    | Lat. [°] | Lon. [°] |
|-----------------|------------------|----------|----------|
| BT-023120090210 | 2009-02-10 20:08 | 22.6671  | 153.2280 |

### Related Information

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