

YOKOSUKA YK13-09 Expendable Bathythermograph (XBT) Fall-rate bias corrected

Last Modified: 2019-10-24

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Cruise ID: [YK13-09](#)

Expendable Bathythermograph (XBT) Fall-rate bias corrected : 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/YK13-09_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/XCTD



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.

Correction method

Fall-rate bias corrected data using new coefficients of Kizu et al. (2005) for all TSK T-5 probes.

[Reference]

Kizu et al. (2005): A New Fall-Rate Equation for T-5 Expendable Bathythermograph (XBT) by TSK. Journal of Oceanography, Vol. 61, pp. 115 to 121

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.

The corrected data were calculated using new coefficients and elapsed time.

The elapsed time was calculated from the original depth which had been calculated by manufacture's coefficients.

| Probe Type | TSK T-5 (New Coefficients of Kizu et al.) | TSK T-5 (Manufacture's Coefficients) |
|---------------|---|--------------------------------------|
| Coefficient-a | 6.54071 | 6.828 |

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

| Cast name | Probe Serial No. | Probe Type | Launcher | Converter |
|------------------|------------------|------------|----------|-----------|
| BT-002220130919p | - | T-5 | Hand | MK-30N |
| BT-002320130923p | - | T-5 | Hand | 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

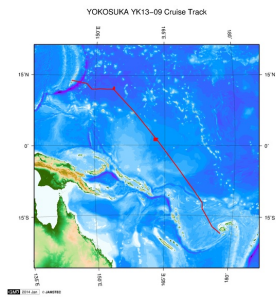
(1) It is reported that T-5 probes produced by Tsurumi Seiki Co. Ltd. (TSK T-5 probes) have a fall-rate bias. Please see the following about publication policy of XBT fall-rate bias correction data.

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

Related Information

Cruise Data

Dive Data



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YK13-09

Ship Name: YOKOSUKA

Period: 2013-09-17 - 2013-10-01

Chief Scientist: Hidetaka Nomaki (JAMSTEC)

Project Name: [QUELLE2013]

Proposal Title: In situ experimental & sampling study to understand abyssal biodiversity and biogeochemical cycles

Update History

| | |
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| 2019-10-24 | An observation data was registerd. |
| 2017-07-13 | An observation data was registerd. |
| 2015-10-31 | An observation data was registerd. |

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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.

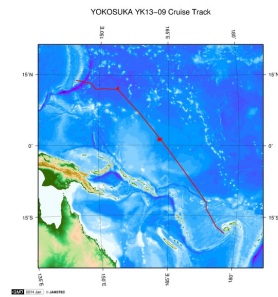
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Sample Program

[ex_read2.f](#)

Related Information

☒ Cruise Data ☐ Dive Data



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 Project Name: [QUELLE2013]
 Proposal In situ experimental & sampling study to understand abyssal biodiversity and biogeochemical cycles
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Data Policy: **JAMSTEC**

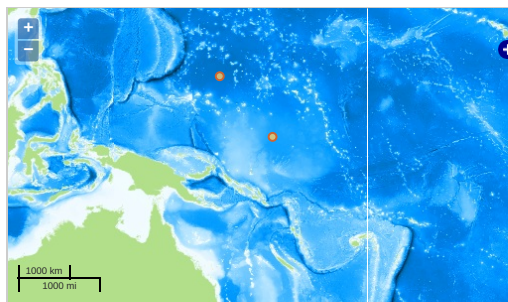
Observation Items: Depth, Temperature

Science Keywords:

OCEANS > OCEAN > WATER
TEMPERATURE TEMPERATURE

Observation Map

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



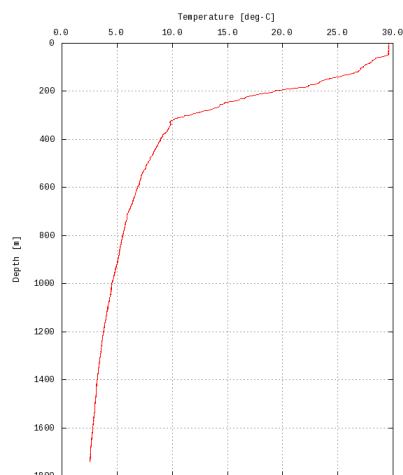
— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

Imagery reproduced from ...

Figures

BT-002220130919p

YK13-09: BT-002220130919p
Expendable Bathythermograph (XBT) Fall-rate bias corrected: 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

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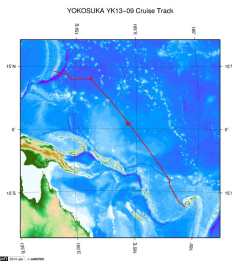
- ☐ File names
- ☐ BT-002220130919p.dat
- ☐ BT-002320130923p.dat
- ☐ ex_read2.f (Sample Program)

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

| Observation | Time and Date | Lat. [°] | Lon. [°] |
|------------------|------------------|----------|----------|
| BT-002220130919p | 2013-09-19 23:41 | 12.0176 | 153.8055 |
| BT-002320130923p | 2013-09-23 17:28 | 1.2511 | 163.1861 |

Related Information

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