

## YOKOSUKA YK17-17 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-12

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Cruise ID: [YK17-17](#)

Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

Data Policy: [JAMSTEC](#)

Observation Items: X, Y and Z component of geomagnetic field anomaly, Absolute value of geomagnetic field anomaly

Science Keywords:

OCEANS > MARINE GEOPHYSICS > MARINE MAGNETICS  
SOLID EARTH > GEOMAGNETISM

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/YK17-17\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/YK17-17_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.

### Period (UTC)

2017-08-02 00:13 – 2017-08-09 23:49

### Instrument

Instrument:

3 component magnetometer



### Overview

The data provided is for corrected three component geomagnetic field anomalies. Three-axes flux-gate sensors with ring-cored coils were fixed on the roof of the bridge.

They measure the following items :

h-component : along track line component, positive for the bow direction pitch.

s-component : across track line component, positive for the starboard side roll.

v-component : vertical component, positive for the downward direction.

The effect of ship motion was eliminated by roll and pitch data which was provided by a tilt sensor. The apparent magnetic influence can be detected through a "Figure of 8 turn"(a pair of clockwise and anti-clockwise turns) on each cruise. If no Figure of 8 turn on the cruise was completed, the latest Figure of 8 turn from the previous cruise was applied. As a quality control, data of low reliability was removed (see Data processing for quality control criteria). Synthetic geomagnetic field values were calculated from IGRF models.

### Measurement System

#### (1) Magnetometer

Manufacturer : Tierra Technica Ltd.

Type : SFG1212

Measurement range :  $\pm 100,000$  nT

Accuracy : less than 100 nT

Resolution : 1 nT

Location : No.1 Laboratory

#### (2) Magnetic Sensor

Manufacturer : Tierra Technica Ltd.

Form : flux-gate sensors with ring-cored coils

Location : Compass deck

#### (3) Attitude sensor and Gyro compass

Manufacturer : IXBLUE

Type : OCTANS

Accuracy(Roll, Pitch) : 0.01 degree

Accuracy(Gyro) : 0.05 degree \*Secant(Lat.)

Location : Tank top(on the bottom of ship)

### Duration of the Figure of 8 turn

In YK17-17 cruise

Date (UTC)

2017/08/04 11:27:00 - 2017/08/04 11:48:00

### Data processing

The following corrections and calculations were performed.

(1) Ship magnetization correction

Yokosuka YK17-17 Cruise Track

- Hob = ARPYF + Hp ---(i)
- Hob: Observed magnetic field vector (Ship coordinates)
- A: Effect of induced magnetization of the ship
- R: Matrix of rotation due to the roll
- P: Matrix of rotation due to the pitch
- Y: Matrix of rotation due to the heading
- F: Geomagnetic field vector
- Hp: Ship's permanent magnetic moment

Following the equation(i), we calculate the geomagnetic field F.

$$RPF = BHob + Hbp \text{ ---(ii)}$$

- B: coefficient of Figure of 8 turn
- Hbp: Permanent magnetic field vector of the ship

Reference: Isezaki,N., A new shipboard three-component magnetometer, GEOPHYSICS. VOL.51,NO10(1986);P1992-1998

#### (2) International Geomagnetic Reference Field (IGRF)

Synthetic geomagnetic field values are calculated from IGRF 12th Generation models by using navigation data ; latitude, longitude and date.

Reference: IAGA Division V-MOD Geomagnetic Field Modeling[<http://www.ngdc.noaa.gov/IAGA/vmod/igrf.html>]

#### (3) Calculation of the geomagnetic field anomaly

$$An = F - Figrf$$

- An: Geomagnetic field anomaly vector
- F: Geomagnetic field vector
- Figrf: Synthetic geomagnetic field vector from IGRF

#### (4) Quality control of data

Following criteria were used for removal of data of low reliability:

- Time error (inversion of time, continuation of same timestamps)
- Summation of the difference of heading by one second exceeding 20 degree per 5 minutes
- Ground speed of the ship below 3knot or exceeding 20knot
- X, Y, or Z component of geomagnetic field anomaly exceeding  $\pm 4000nT$

#### (5) Filtering of the geomagnetic field anomaly

Due to the residual undulation of the ship, a 120 second length Gaussian filter was applied for each component of the geomagnetic field anomaly data.

#### (6) Output of the data

- Time (UTC)
- Latitude (degree)
- Longitude (degree)
- X: Northward (positive on the north) component of geomagnetic field anomaly (nT)
- Y: Eastward (positive on the east) component of geomagnetic field anomaly (nT)
- Z: Vertical (positive for downward) component of geomagnetic field anomaly (nT)
- T: Absolute value of geomagnetic field anomaly (nT)

#### Coefficient of the Figure of 8 turn and Permanent magnetic field vector of the ship

This coefficient was calculated from the above-mentioned Figure of 8 turn

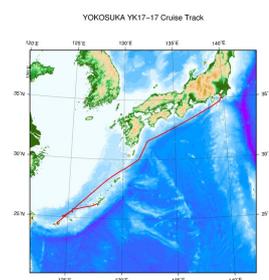
	1.0827	-0.0164	-0.1887		5732.0751
B =	-0.0078	1.1778	-0.1868	Hbp =	15410.5712
	0.0089	0.1065	0.7416		1326.2102

#### Note

- (1) File naming rule: Cruise ID\_corr.stcm
- (2) Sampling rate: 10 seconds
- (3) Geodetic system: WGS84
- (4) If you would like the raw data set, please contact us from "Contact Us" above.

#### Related Information

- Cruise Data
- Dive Data



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#### YK17-17

Ship Name: YOKOSUKA  
Period: 2017-08-02 - 2017-08-10  
Chief Scientist: Hiroko Makita (JAMSTEC)

#### Update History

2019-06-12	An observation data was registerd.
2018-06-16	An observation data was registerd.
2018-02-28	An observation data was registerd.

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Dive ID:

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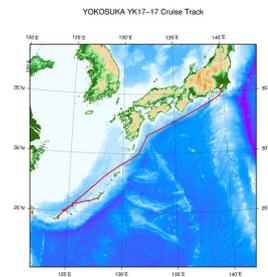
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### STCM Corrected

No.	Column	Content	Format	Unit	Remarks
1	1 - 8	Date	i4,i2,i2		YYYYMMDD (UTC)
2	10 -15	Time	i2,i2,i2		hhmmss (UTC)
3	17 -25	Latitude	f9.5	degree	No sign for the northern hemisphere. Negative for the southern hemisphere.
4	27 -36	Longitude	f10.5	degree	No sign for eastern hemisphere. Negative for the western hemisphere.
5	38 -43	X component of geomagnetic field anomaly	f6.0	nT	Positive on the north
6	45 -50	Y component of geomagnetic field anomaly	f6.0	nT	Positive on the east
7	52 -57	Z component of geomagnetic field anomaly	f6.0	nT	Positive for downward
8	59 -64	Absolute value of geomagnetic field anomaly	f6.0	nT	

### Related Information

Cruise Data  Dive Data



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Period: 2017-08-02 - 2017-08-10  
Chief Scientist: Hiroko Makita (JAMSTEC)

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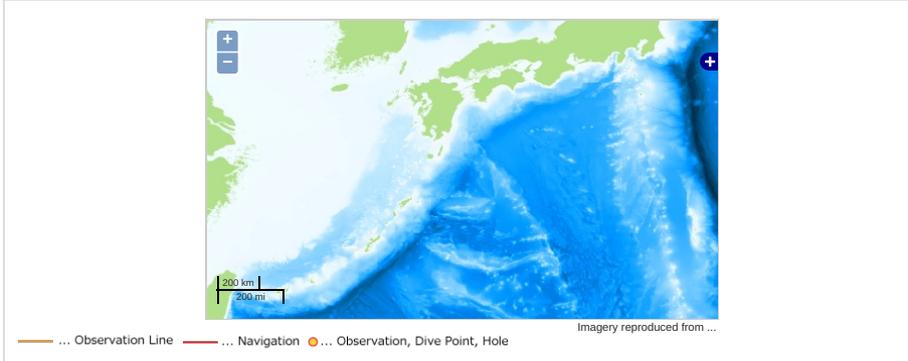
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Science Keywords:

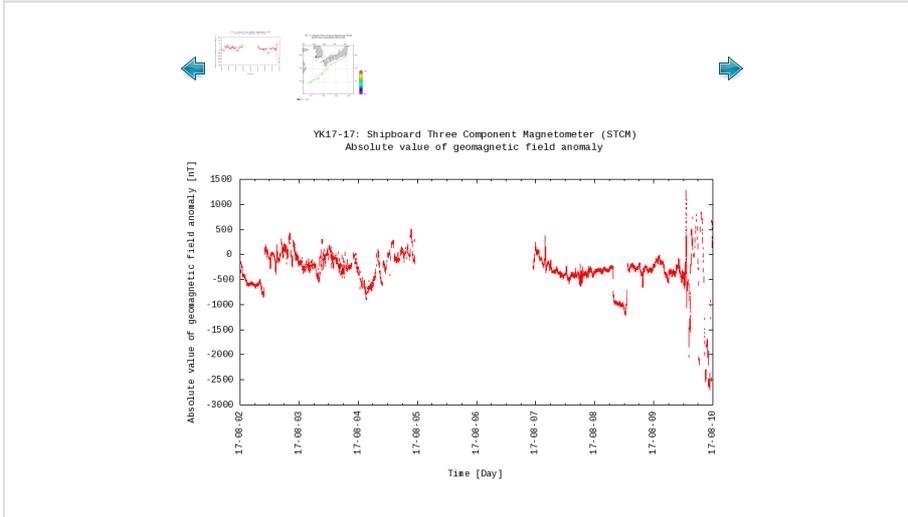
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SOLID EARTH > GEOMAGNETISM

### Observation Map



### Figures



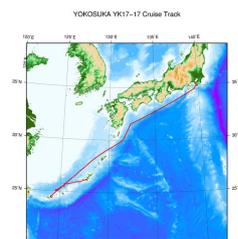
### Data List

File names

YK17-17\_corr.stcm

### Related Information

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Period: 2017-08-02 - 2017-08-10  
Chief Scientist: Hiroko Makita (JAMSTEC)

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