

## YOKOSUKA YK09-09 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-15

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

Cruise ID: [YK09-09](#)

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/YK09-09\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/YK09-09_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.

### Period (UTC)

2009-07-19 00:00 – 2009-07-28 23:11

### 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 (see section 4.). As a quality control, data of low reliability was removed (see section 5. 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

Manufacturer : IXBLUE  
Type : OCTANS  
Measurement range :  $\pm 180$  degree(Roll),  $\pm 90$  degree(Pitch)  
Accuracy : 0.01 degree  
Location : Tank top(on the bottom of ship)

#### (4) Gyro compass

Manufacturer : TOKIMEC INC.  
Type : ES-110  
Follow-Up Speed : 24 degree / sec  
Accuracy :  $\pm 1.0$  degree \*Secant(Lat.)  
Location : No.1 Laboratory

### Duration of the Figure of 8 turn

15:00:00 ~ 15:00:00

in YK09-08 cruise  
Date (UTC)  
2009-07-03 04:32:00 - 2009-07-03 04:44:00  
2009-07-04 11:32:00 - 2009-07-04 11:45:00  
2009-07-14 13:55:00 - 2009-07-14 14:09:00  
2009-07-16 06:25:00 - 2009-07-16 06:38:00

Data processing

The following corrections and calculations were performed.

- (1) Ship magnetization correction  
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.  
RPYF = BHob + Hbp ---(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 11th 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 ±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 Figure of 8 turn (see section 4.)

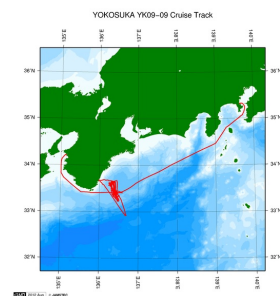
|    |         |        |        |      |            |
|----|---------|--------|--------|------|------------|
|    | 1.0882  | 0.0322 | 0.0114 |      | -1056.6807 |
| B= | -0.0224 | 1.2131 | 0.0440 | Hbp= | 4927.0925  |
|    | 0.0014  | 0.1286 | 0.8993 |      | -5740.1519 |

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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#### YK09-09

Ship Name: YOKOSUKA

Period: 2009-07-18 - 2009-07-28

Chief Scientist: Takafumi Kasaya (JAMSTEC)

Proposal ▶ Research for the fluid distribution around the spray fault using the control source EM method

#### Update History

|            |                                    |
|------------|------------------------------------|
| 2019-06-15 | An observation data was registerd. |
| 2018-03-03 | An observation data was registerd. |
| 2014-09-11 | An observation data was registerd. |
| 2012-09-28 | An observation data was registerd. |

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NATSUSHIMA  
KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

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KAIKO  
SHINKAI 2000  
SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER (SHELL)  
POWER GRAB SAMPLER (CLOW)  
BMS

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:

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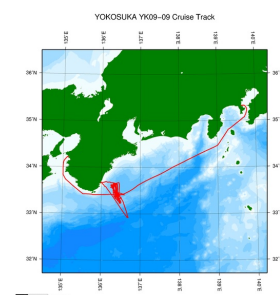
Data Policy: [JAMSTEC](#)

### 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.<br>Negative for the southern hemisphere. |
| 4   | 27 -36 | Longitude                                   | f10.5    | degree | No sign for eastern hemisphere.<br>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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#### YK09-09

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Period: 2009-07-18 - 2009-07-28

Chief Scientist: Takafumi Kasaya (JAMSTEC)

Proposal ▶ Research for the fluid distribution around the spray fault using the control source EM method

### Update History

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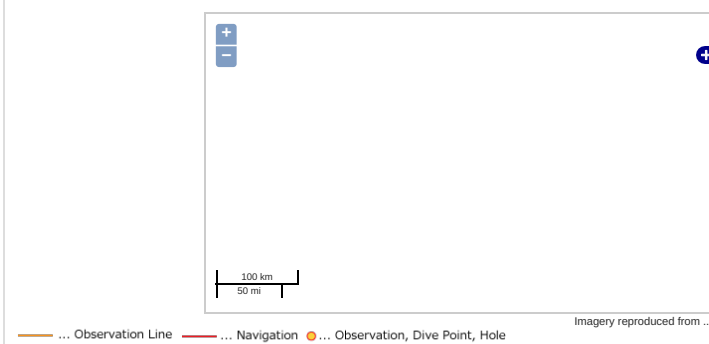
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Observation Items: X, Y and Z component of geomagnetic field anomaly, Absolute value of geomagnetic field anomaly

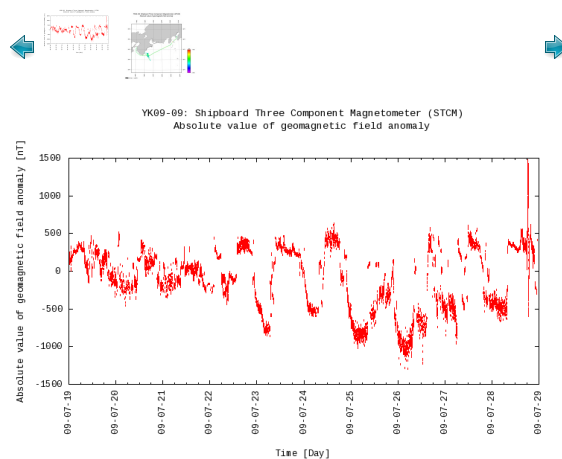
Science Keywords:

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### Observation Map



### Figures



### Data List

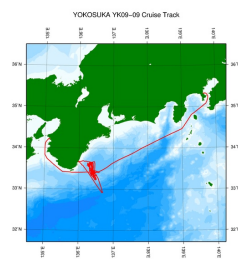
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File names

☐ YK09-09\_corr.stcm

### Related Information

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Ship Name: YOKOSUKA

Period: 2009-07-18 - 2009-07-28

Chief Scientist: Takafumi Kasaya (JAMSTEC)

Proposal ▶ Research for the fluid distribution around the spray fault using the control source EM

Title: method

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