

## YOKOSUKA YK09-08 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-15

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Cruise ID: [YK09-08](#)

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/YK09-08\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/YK09-08_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)

2009-06-29 01:13 – 2009-07-01 08:02  
2009-07-02 19:41 – 2009-07-05 02:55  
2009-07-05 09:09 – 2009-07-05 11:04  
2009-07-06 13:53 – 2009-07-09 05:04  
2009-07-10 15:35 – 2009-07-13 08:35  
2009-07-13 21:48 – 2009-07-17 04:14

### 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 :±1.0 degree \*Secant(Lat.)  
Location : No.1 Laboratory

#### Duration of the Figure of 8 turn

On this 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

$$Hob = RPYF + Hp \text{ ---(i)}$$

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.

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

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 11th Generation models by using navigation data ; latitude, longitude and date.

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

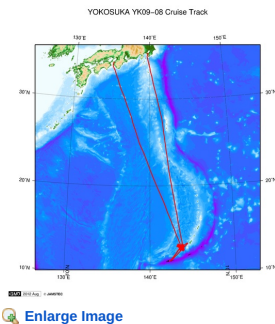
	1.0882	0.0322	0.0114		-1056.6807
B=	-0.0224	1.2131	0.0440	Hbp=	4927.0925
	0.0014	0.1286	0.8993		-5740.1519

#### 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



#### YK09-08

Ship Name: YOKOSUKA

Period: 2009-06-29 - 2009-07-17

Chief Scientist: Kyoko Okino (The University of Tokyo)

Proposal ▶ High-resolution, 3-dimensional and multi-sensor mapping of three hydrothermal sites in the southern Mariana Trough

#### Update History

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

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KAIYO

YOKOSUKA

MIRAI

KAIREI

CHIKYU

KAIMEI

SHINSEI MARU

HAKUHO MARU

#### Information of the Submersibles

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

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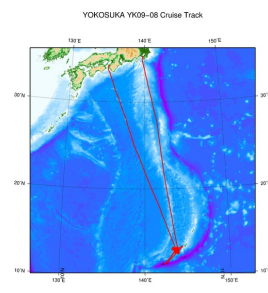
Data Policy: [JAMSTEC](#)

### 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. 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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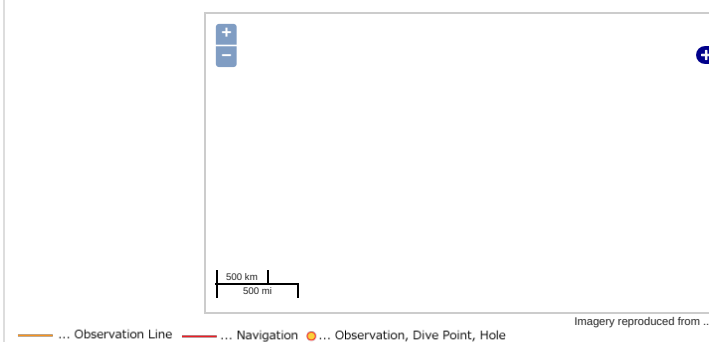
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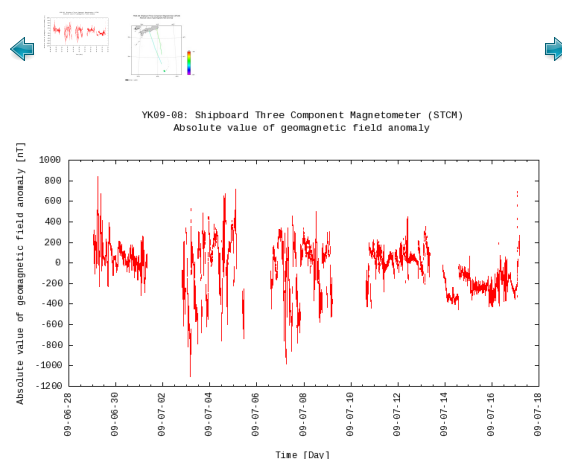
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### Observation Map



### Figures



### Data List

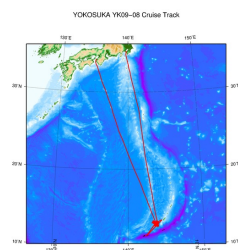
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File names

☐ YK09-08\_corr.stcm

### Related Information

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