

## YOKOSUKA YK12-04 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-14

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Cruise ID: [YK12-04](#)

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

### 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)

2012-04-02 01:13 – 2012-04-17 23:42

### 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 and Gyro compass

Manufacturer : IXBLUE

Type : OCTANS

Measurement range :  $\pm 180$  degree(Roll),  $\pm 90$  degree(Pitch), 0 to +360 degree(Gyro)

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 YK12-03 cruise

Date (UTC)

2012/03/20 09:10:00 - 2012/03/20 09:31:00

2012/03/20 20:46:00 - 2012/03/20 21:08:00

### Data processing

The following corrections and calculations were performed.

#### (1) Ship magnetization correction

See : [JAMSTEC](#)

$Hob = A + P + Y + Hp$  ---(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  $\pm 4000nT$

#### (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 Figure of 8 turn (see section 4.)

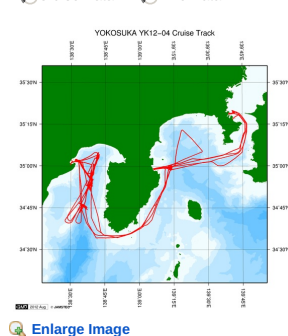
	1.0847	0.0045	-0.0055		-355.3169
B=	-0.0004	1.2039	-0.0078	Hbp=	7415.2749
	0.0005	0.1230	0.8653		-4455.2236

#### 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



**YK12-04**  
 Ship Name: YOKOSUKA  
 Period: 2012-04-02 - 2012-04-17  
 Chief Scientist: Toshiaki Sakurai (NME)

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#### Update History

2019-06-14	An observation data was registerd.
2018-03-01	An observation data was registerd.
2017-09-07	An observation data was registerd.
2014-09-12	An observation data was registerd.
2012-09-28	An observation data was registerd.

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6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER  
(SHELL)  
POWER GRAB SAMPLER  
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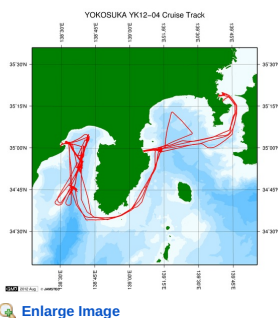
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### STCM Corrected

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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Chief Scientist: Toshiaki Sakurai (NME)

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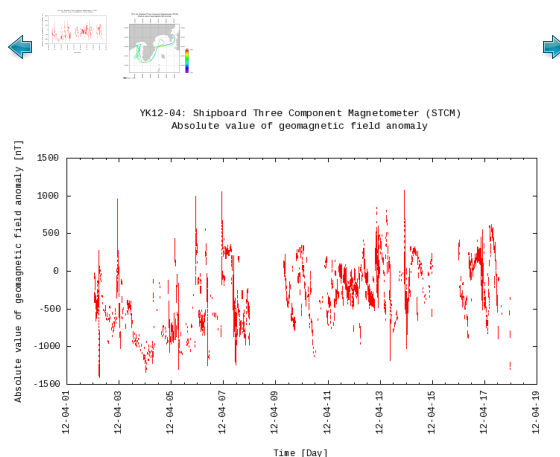
OCEANS > MARINE GEOPHYSICS > MARINE  
MAGNETICS

SOLID EARTH > GEOMAGNETISM

### Observation Map



### Figures



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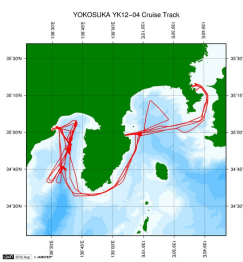
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File names

☐ YK12-04\_corr.stcm

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