

## YOKOSUKA YK14-18 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2022-02-28

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Cruise ID: **YK14-18**

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

Technology development program for enhancing utilization of marine resources (MEXT): Development of systems for wide area survey of seafloor mineral resources

#### Use Constraints

See [Terms and Conditions](#) about constrain of use.

#### Data Citation

See [Terms and Conditions](#) about data citation.

### Period (UTC)

2014-09-22 00:18 – 2014-10-02 23:30

### 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 YK14-18 cruise

Date (UTC)

2014/09/29 09:38:00 - 2014/09/29 09:59:00

2014/10/01 10:02:00 - 2014/10/01 10:23:00

### Data processing

The following corrections and calculations were performed.

#### (1) Ship magnetization correction

$Hob = ARPYF + Hp \rightarrow (i)$

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.  
 $RPYF = BHob + Hpb$  ---(ii)  
B : coefficient of Figure of 8 turn  
Hpb : 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 13th 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**

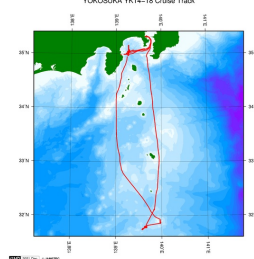
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0849	-0.0006	-0.0132		-341.4032
B=	0.0051	1.2116	0.0386	Hpb=	6420.8603
	0.0102	0.1168	0.7905		218.9843

**Note**


- (1) File naming rule : Cruise ID\_corr.stom
- (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**



YOKOSUKA YK14-18 Cruise Track

**YK14-18**  
Ship Name: YOKOSUKA  
Period: 2014-09-22 - 2014-10-03  
Chief Scientist: Akira Asada (The University of Tokyo)

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**Update History**

2022-02-28	An observation data was registerd.
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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)  
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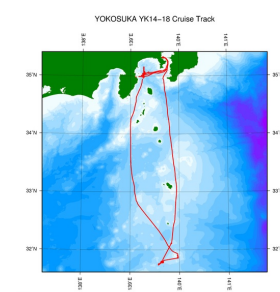
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### STCM Corrected

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



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#### YK14-18

Ship Name: YOKOSUKA

Period: 2014-09-22 - 2014-10-03

Chief Scientist: Akira Asada (The University of Tokyo)

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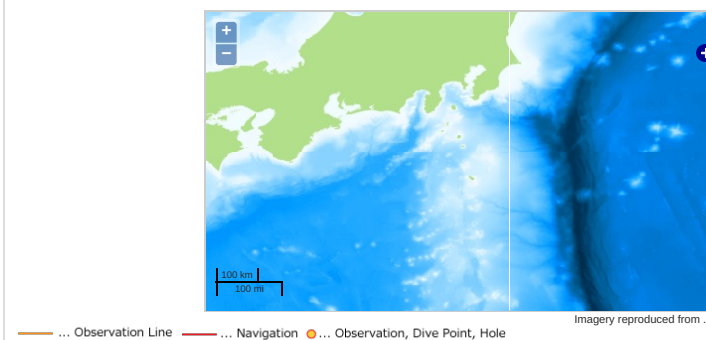
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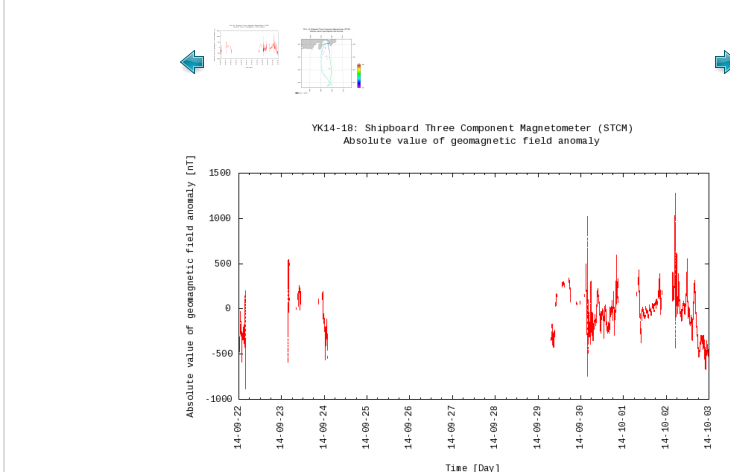
OCEANS > MARINE GEOPHYSICS > MARINE  
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### Observation Map



### Figures



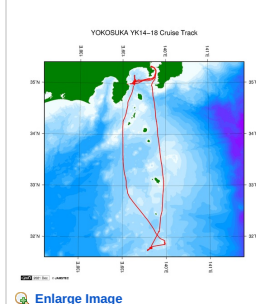
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File names

☐ YK14-18\_corr.stcm

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Period: 2014-09-22 - 2014-10-03  
Chief Scientist: Akira Asada (The University of Tokyo)

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