

YOKOSUKA YK18-13C Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [YK18-13C](#)

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/YK18-13C_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)

2018-09-29 00:04 – 2018-10-10 23:39

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 YK19-01 cruise

Date (UTC)

2019/02/18 04:39:50 - 2019/02/18 05:02:35

Data processing

The following corrections and calculations were performed.

(1) Ship magnetization correction

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

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

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

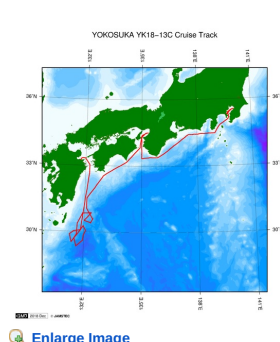
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0794	0.0145	-0.0091		-589.8028
B =	-0.0057	1.1841	-0.1228	Hbp =	14123.6931
	0.0105	0.1140	0.8004		-132.2761

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



YK18-13C

Ship Name: YOKOSUKA
Period: 2018-09-29 - 2018-10-10
Chief Scientist: Tsutomu Takahashi (JAMSTEC)
Project Name: [Research project for earthquake and disaster prevention in the wide area around the Nankai Trough]
Proposal Title: Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region

Update History

2019-08-26	An observation data was registered.
2019-06-30	An observation data was registered.

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6K Sonar DEEP TOW
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(SHELL)
POWER GRAB SAMPLER
(CLOW)
BMS

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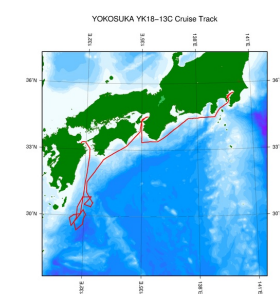
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STCM Corrected

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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YK18-13C

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Chief Scientist: Tsutomu Takahashi (JAMSTEC)

Project Name: [Research project for earthquake and disaster prevention in the wide area around the Nankai Trough]

Proposal: Research project for compound disaster mitigation on the great earthquakes and tsunamis

Title: around the Nankai trough region

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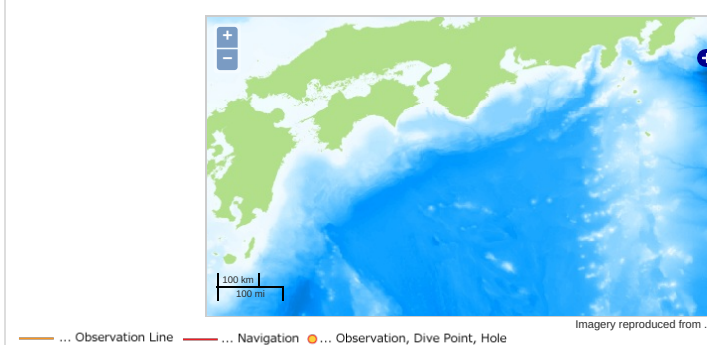
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Science Keywords:

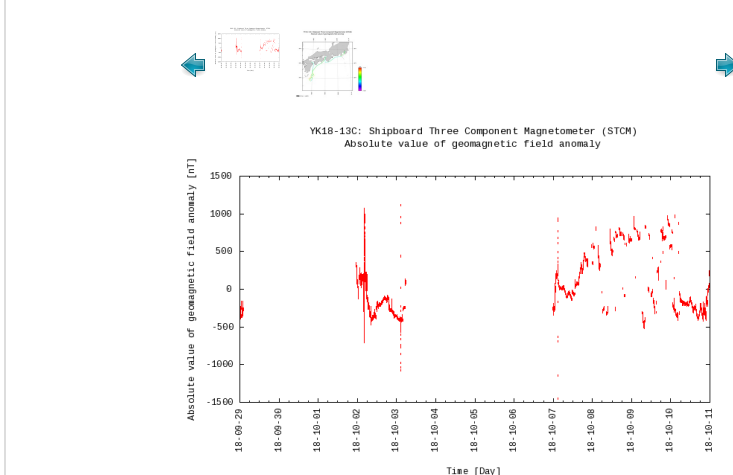
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Observation Map



Figures



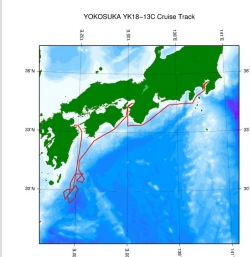
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File names

☐ YK18-13C_corr.stcm

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