

## YOKOSUKA YK13-11 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-14

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

Cruise ID: [YK13-11](#)

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/YK13-11\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/YK13-11_all.pdf)

### For Using Data

#### Principal Investigator

JAMSTEC QUELLE 2013/NIWA

#### Use Constraints

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

#### Data Citation

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

### Period (UTC)

2013-10-24 23:06 – 2013-11-01 11:37

### 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  
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 this cruise

Date (UTC)

2013/10/29 05:37:00 - 2013/10/29 05:58:00

2013/10/29 16:53:00 - 2013/10/29 17:14:00

### 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.  
 $RPYF = BHob + Hbp \text{ ---(ii)}$   
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>]

- (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

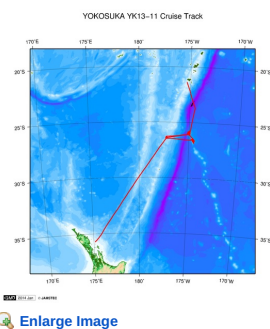
		1.0800	0.0041	-0.0400		-2560.3282
B=		-0.0032	1.1899	-0.1052	Hbp=	618.2285
		0.0104	0.1189	0.7638		-7990.8749

#### 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



**YK13-11**  
Ship Name: YOKOSUKA  
Period: 2013-10-23 - 2013-11-01  
Chief Scientist: Shinji Tsuchida (JAMSTEC)  
Project Name: [QUELLE2013]  
Proposal ▶ Comparative studies of biology, geology, and geochemistry on subducting seamounts in the Louisville Seamount and active volcanoes in the Kermadec Arc.  
Title:

#### 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.
2016-01-31	An observation data was registerd.

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Cruise ID:

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Dive ID:

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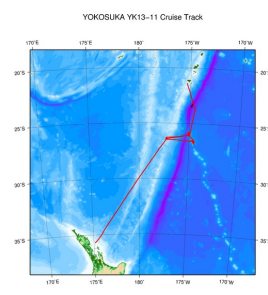
Data Policy: [JAMSTEC](#)

### 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. 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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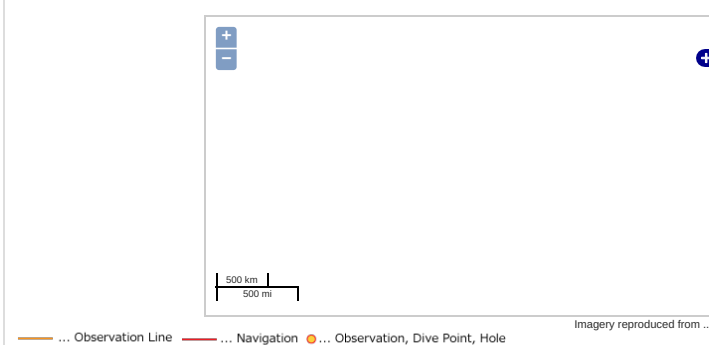
Data Policy: **JAMSTEC**

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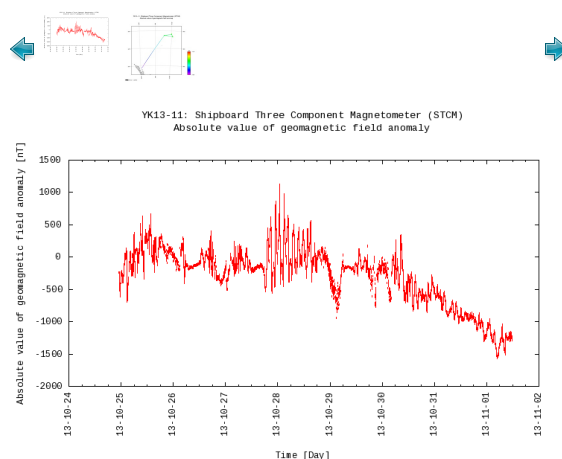
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### Observation Map



### Figures



### Data List

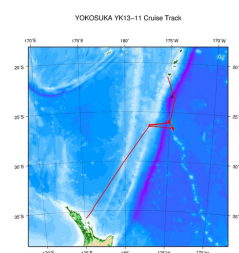
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File names

☐ YK13-11\_corr.stcm

### Related Information

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Period: 2013-10-23 - 2013-11-01

Chief Scientist: Shiriji Tsuchida (JAMSTEC)

Project Name: [QUELLE2013]

Proposal ▶ Comparative studies of biology, geology, and geochemistry on subducting seamounts in the Louisville Seamount and active volcanoes in the Kermadec Arc.

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