

## KAIREI KR15-11 Leg1 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2018-03-15

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Cruise ID: [KR15-11 Leg1](#)

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/KR15-11\\_leg1\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/KR15-11_leg1_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)

2015-07-22 00:16 – 2015-07-27 01:28

### 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 : SFG1214

Measurement range :  $\pm 100,000$  nT

Accuracy : less than 100 nT

Resolution : 1 nT

Location : No.2 Laboratory (Dry 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 KR15-10 cruise

Date (UTC)

2015-07-06 03:05:00 - 2015-07-06 03:26:00

2015-07-07 09:00:00 - 2015-07-07 09:19:00

### 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 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**

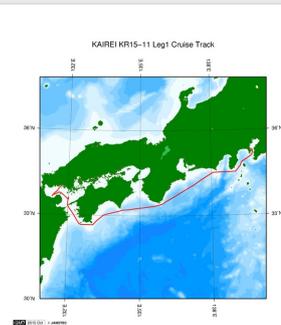
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0947	0.0799	-0.0582		995.5233
B=	-0.0779	1.2986	-0.0683	Hbp=	-2156.3255
	-0.0240	0.0038	0.8352		-6178.9423

**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**



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**KR15-11 Leg1**

Ship Name: KAIREI  
 Period: 2015-07-22 - 2015-07-27  
 Chief Scientist: Tsutomu Takahashi (JAMSTEC)  
 Project Name: [Research project for earthquake and disaster prevention in the wide area around the Nankai Trough]  
 Proposal ▶ Integrated Research Project on Seismic and Tsunami Hazards Around the Sea of Japan  
 Title:

**Update History**

- |            |                                     |
|------------|-------------------------------------|
| 2018-03-15 | An observation data was registered. |
| 2017-08-23 | An observation data was registered. |
| 2016-03-07 | An observation data was registered. |

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**Data**  
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Data Tree  
Detailed Search

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SHINSEI MARU  
HAKUHO MARU

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SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER (SHELL)  
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JAPAN AGENCY FOR MARINE EARTH SCIENCE AND TECHNOLOGY

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Cruise ID: [KR15-11 Leg1](#)

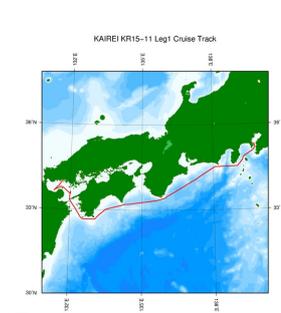
Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

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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



[Enlarge Image](#)

#### KR15-11 Leg1

Ship Name: KAIRESI

Period: 2015-07-22 - 2015-07-27

Chief Scientist: Tsutomu Takahashi (JAMSTEC)

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

Proposal ▶ Integrated Research Project on Seismic and Tsunami Hazards Around the Sea of Japan

Title:

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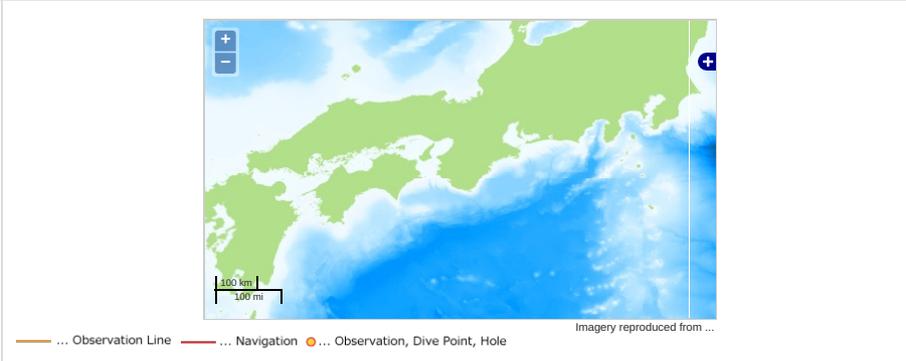
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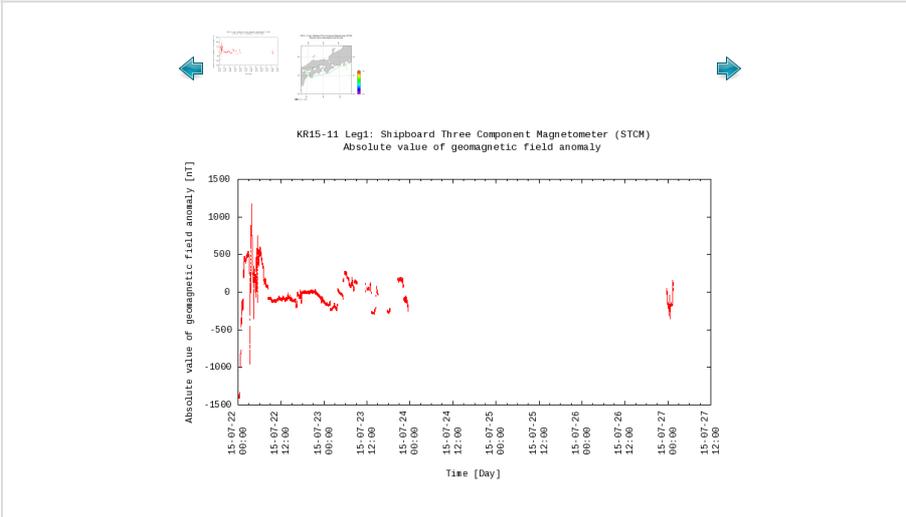
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**Observation Map**



**Figures**

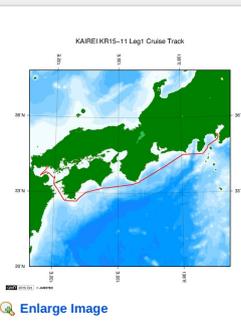


**Data List**

File names

KR15-11\_leg1\_corr.stcm

**Related Information**



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 Ship Name: KAIREI  
 Period: 2015-07-22 - 2015-07-27  
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